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The
University of Minnesota
Bulletin

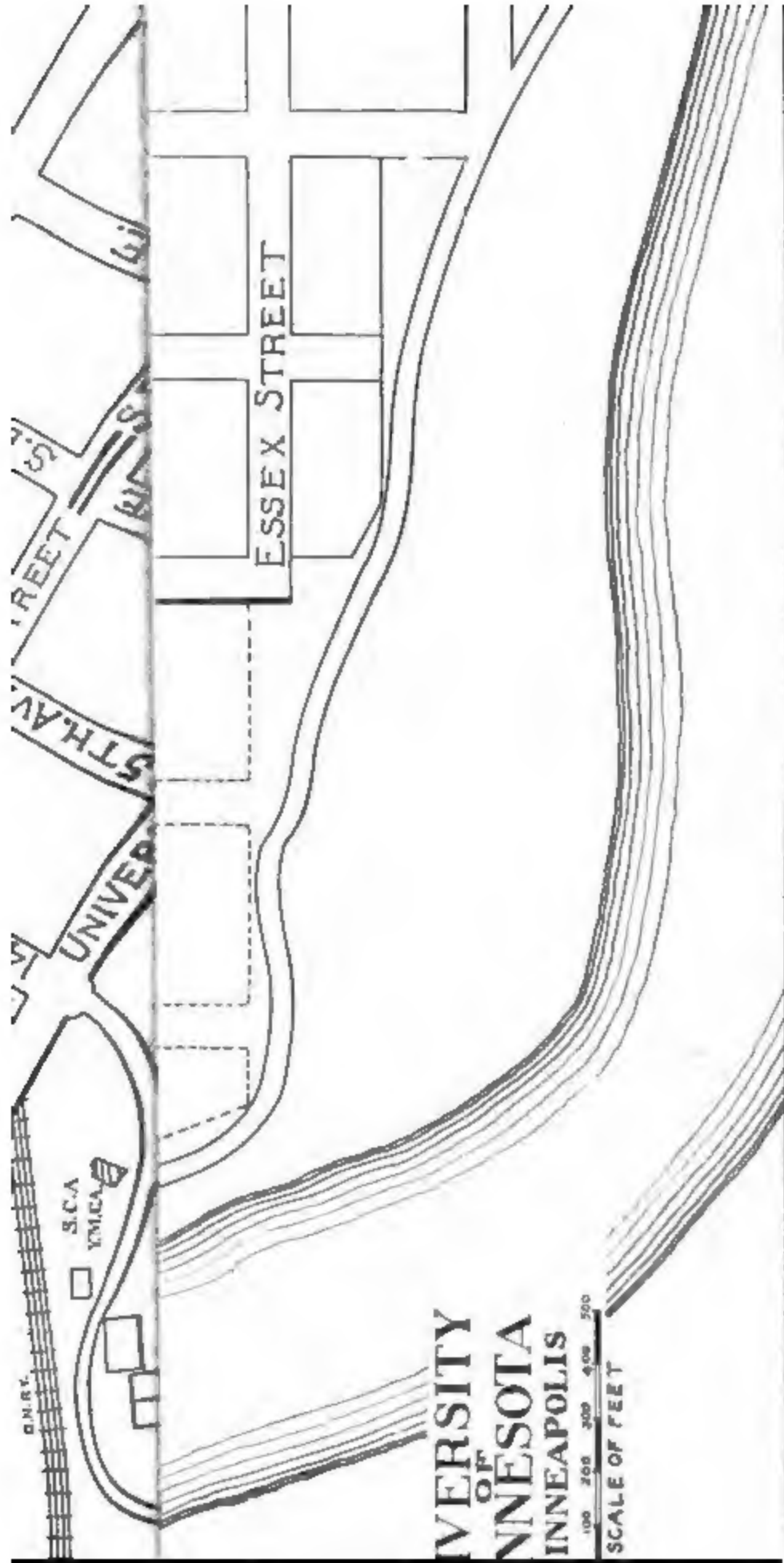
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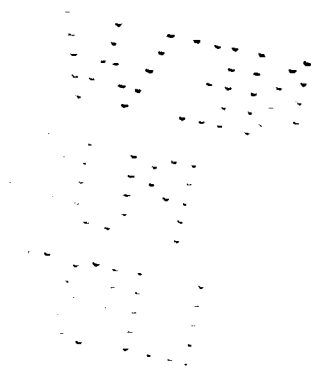
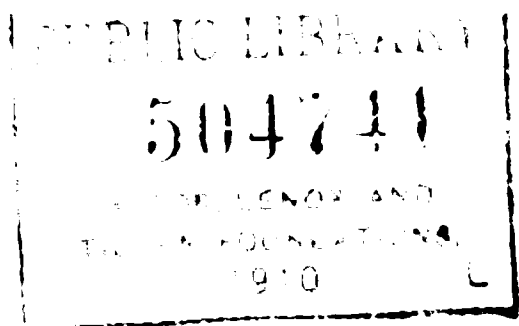
1908-1909

Volume XI

November 10, 1908

Published at the University
for the Board of Regents
University of Minnesota





THE UNIVERSITY OF MINNESOTA

CATALOGUE

FOR THE YEAR

1907-1908

AND

ANNOUNCEMENTS

FOR THE YEAR

1908-1909

Entered as Second-class Matter in the Postoffice at Minneapolis

**PUBLISHED BY THE UNIVERSITY
MINNEAPOLIS
1908**

**THE EAGLE PRINTING COMPANY, PRINTERS
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College of Education	
The Graduate School	
X. DEGREES CONFERRED 1907	
X. LIST OF STUDENTS ARRANGED IN ORDER OF COLLEGES..	
NDEN	

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I
GENERAL
UNIVERSITY INFORMATION



NOV 1964
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CALENDAR FOR 1908-1909

1908

1909

MAY

S.	M.	T.	W.	T.	F.	S.
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JANUARY

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FEBRUARY

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JUNE

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University Calendar

1907-1908

THE UNIVERSITY YEAR

The University year covers a period of thirty-eight weeks beginning on the second Tuesday in September. Commencement day is always the second Thursday in June.

FEBRUARY	4 T	Second semester begins—classes called for regular work
	12 W	Lincoln's birthday—legal holiday
	22 S	Washington's birthday—legal holiday
APRIL	17 F	Good Friday. Recess two days
MAY	2 Th	Regular meeting Board of Regents
	25 M	Senior examinations begin
	30 S	Decoration Day—legal holiday
JUNE	1 M	Semester examinations begin
	6 S	Semester examinations close

COMMENCEMENT WEEK, 1908

SUNDAY	June 7	Baccalaureate service
MONDAY	June 8	Senior class exercises
TUESDAY	June 9	Phi Beta Kappa address. Senior promenade
WEDNESDAY	June 10	Alumni Day. Regular meeting Board of Regents
THURSDAY	June 11	Commencement Day. The thirty-sixth annual commencement
FRIDAY	June 12	Summer vacation begins

1908-1909

SEPTEMBER	7-14	Entrance examinations, condition examinations and registration
	15 T	Classes called for regular work. Seventeenth annual session
OCTOBER	1 Th	Regular meeting Board of Regents
	5 M	Regular meeting University Council. Opening day, School of Agriculture
NOVEMBER	26 Th	Thanksgiving Day. Recess three days
DECEMBER	7 M	Regular meeting University Council
	8 T	Annual meeting Board of Regents
	19 S	Holiday recess begins (no classes)
JANUARY	5 T	Work resumed in all departments
	23 S	Semester examinations begin
	30 S	Semester examinations close
FEBRUARY	2 T	Second semester begins—classes called for regular work
	12 F	Lincoln's birthday—legal holiday
	22 M	Washington's birthday—legal holiday
APRIL	5 M	Regular meeting University Council
	9 F	Good Friday. Recess two days

MAY	6 Th	Regular meeting Board of Regents
	24 M	Senior examinations begin
	31 M	Decoration Day—legal holiday
JUNE	1 T	Semester examinations begin
	5 S	Semester examinations close
	7 M	Regular meeting University Council

COMMENCEMENT WEEK, 1909

SUNDAY	June 6	Baccalaureate service
MONDAY	June 7	Senior class exercises
TUESDAY	June 8	Sigma Xi address. Senior promenade
WEDNESDAY	June 9	Alumni Day. Regular meeting Board of Regents
THURSDAY	June 10	Commencement Day. The thirty-seventh annual commencement
FRIDAY	June 11	Summer vacation begins

PROGRAM—ENTRANCE EXAMINATIONS

MONDAY,	September 7,	9 A. M.	3 Botany 3 Zoology 1 Astronomy 3 Geology
		2 P. M.	2 American Government 2 Political Economy
TUESDAY,	September 8,	9 A. M.	2 History 5 Physics
		2 P. M.	4 Chemistry 3 Physiography
WEDNESDAY,	September 9,	9 A. M.	1 English
		2 P. M.	1 German 1 French 1 Latin 1 Scandinavian
THURSDAY,	September 10,	9 A. M.	1 Elementary Algebra 2 Commercial Geography
		2 P. M.	1 Higher Algebra
FRIDAY,	September 11,	9 A. M.	1 Plane Geometry
		2 P. M.	1 Solid Geometry

1 Folwell Hall, 2 Library Building, 3 Pillsbury Hall, 4 Chemical Laboratory, 5 Physics Building, 6 Mechanic Arts Building.

PROGRAM OF CONDITION EXAMINATIONS

TUESDAY,	September 8,	9 A. M.	English, Rhetoric, Sociology
		2 P. M.	Mathematics, Philosophy, Psychology
WEDNESDAY,	September 9,	9 A. M.	Animal Biology, Botany, Geology, Physics
		2 P. M.	Astronomy, Chemistry, Economics, Drawing
THURSDAY,	September 10,	9 A. M.	French, German, Greek, Scandinavian
		2 P. M.	History, Latin, Education, Politics

For notice of the class-rooms in which these examinations will be given, see bulletin in library building.

• The school year for 1909-10 will begin Tuesday, Sept. 14.

PROGRAM--SUPPLEMENTARY EXAMINATIONS

College of Engineering and Mechanic Arts, School of Mines

TUESDAY,	Sept. 8,	9:00-12:00	Mathematics and Mechanics
		2:00-5:00	Mining Engineering Subjects
WEDNESDAY,	Sept. 9,	9:00-12:00	Chemistry
		2:00-5:00	Drawing and Descriptive Geometry
THURSDAY,	Sept. 10,	9:00-12:00	Mechanical Engineering subjects
		2:00-5:00	Metallurgical subjects
FRIDAY,	Sept. 11,	9:00-12:00	Physics
		2:00-5:00	Electrical Engineering subjects
			Geology and Mineralogy

SCHEDULE OF EXAMINATIONS FOR ADVANCED STANDING
AND TO REMOVE CONDITIONS

Medical Department

September 7-12, 1908.

Monday, Sept. 7, 9:00 a. m.

- I. Year.
- II. Year Histology and Embryology, practical.
- III. Year Special Pathology and Bacteriology, practical.
- IV. Year by arrangement.

2:00 p. m.

- I. Year Histology and Embryology, practical.
- II. Year General Pathology and Bacteriology, practical.
- III. Year Practical Pharmacy.
- IV. Year by arrangement.

Tuesday, Sept. 8, 9:00 a. m.

- I. Year Physiology.
- II. Year Chemistry.
- III. Year Principles of Surgery.

2:00 p. m.

- I. Year Histology and Embryology, written.
- II. Year Histology and Embryology, written.
- III. Year Surgery.

Wednesday, Sept. 9, 9:00 a. m.

- I. Year Chemistry.
- II. Year Physiology.
- III. Year Practice of Medicine.

2:00 p. m.

- I. Year.
- II. Year General Pathology and Bacteriology, written.
- III. Year Special Pathology and Bacteriology, written.

Thursday, Sept. 10, 9:00 a. m.

- I. Year Anatomy.
- II. Year Anatomy.
- III. Year Surgical Anatomy.

2:00 p. m.

- I. Year.
- II. Year Materia Medica and Pharmacology.
- III. Year Therapeutics.

Examination for advanced standing and to remove conditions in the following third and all fourth year subjects will be held by *appointment* during September 7-12: Diseases of Children Physical Diagnosis, all elective subjects, and all subjects not listed above. In all subjects not specifically scheduled, condition examinations must be arranged for not later than Sept. 7.

Students must register for examinations in dean's office at least twenty-four hour prior to any examination they may wish to take. See also under Rules, page 41, for regulations concerning unremoved conditions, etc.

Conditioned students will not be admitted to any examination without presenting receipt from the cashier for the examination fee, to the dean and administering professor.

The University

THE UNIVERSITY OF MINNESOTA comprises the following named schools, colleges and departments:

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

THE DEPARTMENT OF AGRICULTURE, including—

The College of Agriculture

The School of Agriculture

Short Course for Farmers

The Dairy School

The Crookston School of Agriculture

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE GRADUATE SCHOOL

The Regents of the University have entrusted to their charge:

THE EXPERIMENT STATIONS, including—

The Main Station at St. Anthony Park

The Sub-Station at Crookston

The Sub-Station at Grand Rapids

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

Bulletins of these schools, colleges and departments may be obtained upon application to the University Registrar.

IN the COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS, there is a four-year course of study leading to the degree, Bachelor of Arts. The work of the first year is elective within certain limitations as to the range of subjects from which the electives may be chosen. The remaining work of the course is entirely elective, with the provision that a certain number of long courses be selected. The course is so elastic that it permits the student to make the general scope of his course elastic, scientific or literary, to suit his individual purpose.

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS was founded in accordance with the Laws of the State of Minnesota and of the Federal Government, its object being "to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." It offers courses of study, of five years each, in civil, mechanical, electrical and municipal engineering, leading to the degrees of civil, mechanical or electrical engineer, the degree of Bachelor of Science being conferred at the end of the fourth year. This college also offers work in the Graduate School leading to the degree of Master of Science.

THE COLLEGE OF AGRICULTURE offers a four-year course in agriculture. The degree of Bachelor of Science, in Agriculture, is conferred upon completion of the course. Students in this College may specialize along the line of forestry or of home economics and secure the degree, Bachelor of Science (in Forestry, or in Home Economics).

THE SCHOOL OF AGRICULTURE offers a three-year course of study and is a training school for practical farm life and in domestic economy. The College of Agriculture is open to graduates of this School who have completed the fourth year of work required for admission to the College.

THE DAIRY SCHOOL offers practical instruction in dairying, specially designed for those who are actually engaged in the manufacture of butter and cheese.

THE SHORT COURSE FOR FARMERS is designed to be of the greatest help possible to those actually engaged in farming.

THE CROOKSTON SCHOOL OF AGRICULTURE offers a course of study quite similar to that given in the School of Agriculture.

It is the object of the COLLEGE OF LAW of the University of Minnesota to educate its students by means of the study of jurisprudence, and at the same time so familiarize them with the fundamental principles of positive law that they will be able, at the end of their course, to safely enter upon the duties of the legal profession. Education, and not simply information, is the prime object. The power to think clearly, to reason cogently, to perceive distinctions quickly, to investigate thoroughly, to generalize carefully and to express his thoughts accurately are the basal

qualifications of the safe counsellor. To secure for the student these habits of thought and expression should be the aim of both the student himself and his instructor.

The art of practice is taught so far as that is possible in a law school. A system of courts embracing the court of a justice of the peace and the district and supreme courts of the state is organized and maintained. Students begin their practice work in the lowest court, and continue it, under the guidance of an able practitioner, throughout the system. The rules of practice adopted by the District and Supreme Courts of Minnesota are printed and a copy is placed in the hands of each student; the codes of practice in the state are studied with special care, and instruction, covering the work of brief-making, is given the students by a successful member of the bar in daily practice. Jury trials are conducted throughout the senior year, and the usual appeals, motions for new trial, and re-argument and all the other points of practice in the courts of the state are considered as each student proceeds from the justice court up through the district and supreme courts of the system.

The degree Bachelor of Laws is granted upon the completion of the three-year day course, or the four-year evening course, entitling the graduate to admission to the bar without examination.

Two graduate courses are offered, the first leading to the degree Master of Laws, the second to the degree Doctor of Civil Law.

THE COLLEGE OF MEDICINE AND SURGERY, and THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY offer four-year courses of study, of nine months each, requiring two years of collegiate work for admission. Upon completion of either of the prescribed courses the degree, Doctor of Medicine, is conferred.

In the Colleges of Science, Literature, and the Arts, of Medicine and Surgery, and of Homeopathic Medicine and Surgery, there has been established a combined course of six years, leading to the degrees, Bachelor of Science, and Doctor of Medicine.

THE COLLEGE OF DENTISTRY offers a three-year course of study, of nine months each. Upon completion of the prescribed course the degree of Doctor of Dental Surgery is conferred.

THE COLLEGE OF PHARMACY was organized in 1891 upon request of the Minnesota State Pharmaceutical Association. In the organization and conduct of the college, the Board of Regents and the faculty have had the co-operation of the pharmacists of the Northwest. The college is of the University grade and maintains a high standard of entrance and graduation requirements. Every effort is made to comply with the demands of the pharmaceutical profession in the Northwest. The college

offers a regular course extending over two or three years leading to the degree, Bachelor of Pharmacy, and two post-graduate courses, the first requiring at least one additional year of resident work and leading to the degree, Master of Pharmacy, and the second requiring one or two additional years of work and leading to the degree, Doctor of Pharmacy. It is now contemplated to add a four-year course to include somewhat more than is now included in the regular two-year course and about two years of academic work. This course will lead to the degree Bachelor of Science in Pharmacy, and will in all respects be at least the equal of similar courses given in other University colleges of Pharmacy. The course will be inaugurated in 1909 or 1910. The Board of Regents have also authorized the introduction of a course somewhat lower than the regular course now given, to comply however with the requirements of the American Conference of Pharmaceutical Faculties. This course probably will not begin until 1909 and will probably not lead to any degree or to the degree Pharmaceutical Graduate.

THE SCHOOL OF MINES was established in 1889. Its buildings and laboratories are located on the grounds of the University of Minnesota. Students of the School of Mines have, therefore, all the opportunities afforded by a large university. Two regular courses of study are offered, namely, mining engineering and metallurgy, leading to the degrees of Engineer of Mines (E. M.) and Metallurgical Engineer (Met. E.), respectively. The courses in the school are designed with a view of preparing men to enter their profession with a thorough grounding in mathematics, in the sciences, and in the fundamental principles of mining engineering and metallurgy. The technical courses consist of lecture work in mining, metallurgy and allied subjects supplemented by laboratory work in assaying, chemistry, ore dressing and metallurgy; field work in plan and underground surveying; actual practical mining and metallurgical work in Minnesota and western mining centers. A system of apprenticeship during summer vacations has been inaugurated. This work has become part of the curriculum and is required of all students who are candidates for degrees.

Minnesota's enormous iron ore production continually brings before the public the necessity for trained men to aid in the development of the country's mineral resources. The state has developed its School of Mines with this end in view.

THE COLLEGE OF EDUCATION offers a practical and a theoretical training for prospective high school teachers and principals, for principals of elementary schools, for supervisors of special studies, and for superintendents of school systems.

Students are admitted to the college only after the completion of at least two full years of college work, during which time they should have pursued at least one course in general psychology, and prospective high school teachers should have given especial attention to one or more of the subjects which they expect to teach. The two years' course of study, beginning with the junior year, leads to the degree of Bachelor of Arts in Education. Preparation for teaching is planned to include a thorough grounding in the correct use of English, an adequate training in general and in educational psychology, in the history and organization of schools, in educational theory, and in the practice of teaching; and also, quite aside from the liberal training of the regular college course, specific preparation in both the subject matter and the methods of those subjects in the secondary curriculum which each candidate proposes to teach. A third year leads to the degree of master of arts, including advanced studies in education and philosophy, and in one or more of the subjects of the secondary curriculum, at the option of the candidate.

In addition to the ordinary academic and professional studies connected with the training of the teacher, the college offers an opportunity for observation and practice teaching under supervision, as well as special facilities in voice culture, public school music, and physical culture, together with elementary and advanced courses in drawing, domestic art and domestic science, manual training and business education—those specialized forms of the secondary curriculum which are being introduced so rapidly into the public high schools of Minnesota.

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY, leading to the degrees, Bachelor of Science in Chemistry, and Bachelor of Science in Chemical Engineering, offers two courses of study of four years each in analytical and applied chemistry.

THE GRADUATE SCHOOL gathers into a single organization and unites for the purposes of administration all the activities of the University in all its schools and colleges in so far as they relate to advanced instruction offered for the second or higher degrees, viz.: Master of Arts and Doctor of Philosophy conferred for advanced, non-technical study; Master of Science and Doctor of Science for technical study; Master of Laws and Doctor of Civil Law for advanced legal studies. The privileges of this school are in general open to all Bachelors of Arts, of Science, pure and applied, and of Laws, from reputable colleges and universities having courses substantially equivalent to those at this University.

THE UNIVERSITY SUMMER SCHOOL is organized for a six weeks' session in June and July under the direction of the State Department of Public Instruction. In the elementary section courses are given for teach-

ers in all the common school branches and in preparation for the state teacher's certificates. In the college section courses are given for high school teachers and in preparation for the state professional certificate. Students who desire University entrance credits and credits toward the Bachelor's degree may secure these by pursuing not more than two full courses at each session.

SPECIAL COURSES. In each of the Colleges, students of mature age and adequate preparation are permitted to pursue, under the direction of the faculty, one or two distinct lines of study.

EXTENSION LECTURES. Professors in the University are prepared to give a limited number of extension lectures from time to time. For subjects, speakers, terms and dates, application should be made to the Chairman of the Committee on University Extension.

Historical Sketch

When Minnesota was organized as a territory March 3, 1849, it was understood that a grant of public lands would be made by Congress for the endowment and support of a university as in the case of all other states carved out of this old northwest territory.

On December 10, 1850, delegate Sibley gave notice of a bill to grant two townships (46,080 acres) which became law on February 19, 1851. Meantime the Minnesota legislature had by Act, Feb. 13., created the University of Minnesota and made over to that corporation the proceeds of all lands which Congress might grant.

The location of the institution was fixed by this law "at or near the Falls of St. Anthony," by virtue of an understanding relating to the distribution of public buildings. A board of twelve regents elected in classes by the legislature had charge till 1860. In the fall of 1851, a preparatory school was opened. In 1856, intoxicated by the boom which was then raging, the regents began the erection of the rear part of the "old main" building. Before it was finished the panic of 1857 came on. The board could not pay the contractors nor meet the interest on the bonds they had been authorized to sell.

In the winter of 1860 the legislature replaced the old board of twelve regents by one of five appointed by the Governor. At the end of four years this board had not been able to put the finances of the university on a sound footing. Senator John S. Pillsbury laid before the legislature of 1864 a plan to pay off the accumulated debt by the sale of less than one-third of the land grant. A special board of three regents, headed by Mr. Pillsbury, was created to make the experiment. At the close of 1866 this board reported the debt substantially liquidated. A debt of gratitude is due to the creditors and bondholders for scaling down their just claims and accepting sums far below their dues. By means of a small appropriation the special board renovated the building, purchased furniture and appliances, and in November, 1867, opened the preparatory department, to which girls as well as boys were admitted.

This board having accomplished its purpose prepared for the legislature the bill which enacted into law February 13, 1858, became the actual charter of the university. By far the most important element was that which united with the university endowment proper the expected income

from the congressional land grant of 1862 for the support of colleges of agricultural and mechanic arts.

At the close of the college year of 1869 a small company of preparatory students were found ready for college instruction. A faculty of nine professors and instructors was elected and began their work in September. In this year William Watts Folwell was appointed president.

In 1873 two students were graduated at the first commencement. Some twenty years now passed in quiet work and growth, mostly in the academic department. A good beginning was made in that of engineering and mechanic arts, but in spite of most earnest endeavors by the regent, the college of agriculture developed slowly. There was little demand for proper agricultural instruction and the pedagogy of that branch had not been developed.

In the year 1870 Congress confirmed to the state a second grant of public land for a state university ingeniously embodied in the enabling act of Feb. 26, 1857, which the departmental authorities at Washington had persistently refused to recognize.

In September, 1884, Cyrus Northrop succeeded to the presidency and not long after began that great development familiar to all.

The Colleges of Law and Medicine were organized on a self-paying basis. New buildings sprang up, nobly equipped, and the faculties were reinforced as means accumulated. The growth of the College of Agriculture has been remarkable. The congressional appropriations for experiment stations and additional endowment have greatly increased its efficiency and prosperity. The College of Engineering has also enjoyed a rapid and cumulative development. The Colleges of Pharmacy, Dentistry, the Schools of Mines, Chemistry, Education and the Graduate School have been added in recent years, the result of public demands for special tech-

OFFICERS of the UNIVERSITY

The Board of Regents

CYRUS NORTHROP, LL. D., MINNEAPOLIS *Ex-Officio*

The President of the University

The HON. JOHN LIND, MINNEAPOLIS 1914

The President of the Board

The HON. JOHN A. JOHNSON, ST. PETER *Ex-Officio*

The Governor of the State

The HON. JOHN W. OLSEN, ALBERT LEA *Ex-Officio*

The State Superintendent of Public Instruction

The HON. THOMAS WILSON, ST. PAUL 1900

The HON. A. E. RICE, WILLMAR 1900

The HON. B. F. NELSON, MINNEAPOLIS 1910

The HON. PIERCE BUTLER, ST. PAUL 1910

The HON. CHARLES A. SMITH, MINNEAPOLIS 1910

The HON. S. M. OWEN, MINNEAPOLIS 1910

The HON. W. J. MAYO, ROCHESTER 1910

The HON. HENRY B. HOVLAND, DULUTH 1914

C. D. DECKER, MINNEAPOLIS

Secretary of the Board.

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ERNEST B. PIERCE, B. A., *Registrar*

JAMES T. GEROULD, B. A., *Librarian*

C. D. DECKER, *Purchasing Agent*

J. D. BREN, *Cashier*

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FREDERICK S. JONES, M. A., *Dean of the College of Engineering and the Mechanic Arts*

EUGENE W. RANDALL, *Dean and Director of the Department of Agriculture*

WILLIAM S. PATTEE, LL. D., *Dean of the College of Law*

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HENRY T. EDDY, C.E., Ph. D., LL. D., *Dean of the Graduate School*

The University Council

At the regular meeting of the Board of Regents of the University, May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be The University Council. It shall consist of the President of the University, the deans of the various colleges and schools, one elected representative from each college or school for each 400 students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen from the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee

The University press committee

The committee on athletics

The committee on University relations to other institutions of higher learning

The committee on health and sanitation

The committee on commencement and other University functions

The committee on catalogue, programs and courses of study

The committee on student entertainments and social affairs

And such other committees as the general University interests may require

b) Receive reports from such committees and to make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call

Representatives to the Council

The University

PRESIDENT CYRUS NORTHROP

The College of Science, Literature and the Arts

DEAN JOHN F. DOWNEY

PROFESSOR JOHN H. GRAY

PROFESSOR J. C. HUTCHINSON

PROFESSOR H. F. NACHTRIEB

PROFESSOR NORMAN WILDE

The College of Engineering and the Mechanic Arts

DEAN FREDERICK S. JONES

PROFESSOR GEORGE D. SHEPARDSON

The College and School of Agriculture

DEAN EUGENE W. RANDALL

PROFESSOR HARRY SNYDER

PROFESSOR SAMUEL B. GREEN

The College of Law

DEAN WILLIAM S. PATTEE

PROFESSOR HENRY J. FLETCHER

The College of Medicine and Surgery

DEAN F. F. WESBROOK

PROFESSOR THOMAS G. LEE

The College of Homeopathic Medicine and Surgery

DEAN EUGENE J. MANN

University Council Committees

The University Auditing Committee

PROFESSORS ANDERSON, FLETCHER, OWRE, SIGERFOOS, SPRINGER

The Committee on Athletics

PROFESSORS PAIGE, BROOKE, HARDING, D. P. JONES, LITZENBERG

The Committee on Grounds and Sanitation

PROFESSORS FLATHER, BASS, BRACKEN, HICKMAN, RANDALL, SIDENER,
WESBROOK

The Committee on Catalogue, Programs and Course of Study

DEANS APPLEBY, EDDY, FRANKFORTER, JAMES, JONES, MANN, OWRE,
WULLING; PROFESSORS FLETCHER, JOHNSTON, SCHLENKER, SNYDER
E. B. PIERCE

The Press Committee

PROFESSORS SCHAPER, BAUER, CONSTANT, ERDMANN, JAMES

The Committee on Commencement and other University Functions

PROFESSORS NACHTRIEB, JENKS, OWRE, PATTEE, RANDALL, SCHLENKER,
WASHBURN

The Committee on Student Entertainments and Social Affairs

PROFESSORS FRANKFORTER, BASS, COMSTOCK, COOKE, MULLEN, PIKE

The Committee on University Relations to other Institutions of Higher Learning

PROFESSORS DOWNEY, BOTHNE, EDDY, GRAY, GREEN, JAMES, LEE

The Committee on University Extension and University Lectures

PROFESSORS WEST, HAECKER, RANKIN, SCHLENKER, SHEPARDSON

The Committee on the Library

PROFESSORS EDDY, FLETCHER, F. S. JONES, LEE, REYNOLLS,
VAN BARNEVELD, WEST

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Professor of Physics.
- * Died Feb. 27, 1908.
** Died May 29, 1908.
† Resigned June, 1908.

INSTRUCTORS

- FRED L. ADAIR, B.S., M.D. Andrus Building
Clinical Instructor in Obstetrics.
- CEPHAS D. ALLIN, M.A., LL.B. 1005 University Ave. S. E.
Instructor in Political Science.
- E. VILLIERS APPELBY, M.D. Lowry Arcade, St. Paul
Clinical Instructor in Ophthalmology.
- GUSTAVE BACHMAN, Phm.D. Minneapolis
Instructor in Pharmacy, and Laboratory Assistant.
- WALTER BADGER, B.A., B.S. 3311 Portland Ave.
Instructor in Chemistry.
- CHARLES R. BALL, M.D. Minneapolis
Clinical Instructor in Nervous and Mental Diseases.
- GEORGE C. BARTON, M.D. Andrus Building
Clinical Instructor in Gynecology.
- L. B. BASSETT St. Anthony Park
Instructor in Agriculture.
- W. L. BEEBE, D.V.M. St. Anthony Park
Instructor in Bacteriology.
- ARTHUR E. BENJAMIN, M.D. Pillsbury Building
Clinical Instructor in Diseases of Women.
- EMMA BERTIN 1223 Fourth St. S. E.
Instructor in French.
- MARGARET BLAIR St. Anthony Park
Instructor in Sewing and Household Art.
- FANNIE C. BOUTELLE St. Anthony Park
Preceptress, English, Social Culture, School of Agriculture.
- CHARLES H. BRADLEY, M.D. Donaldson Building
Clinical Instructor in Medicine.
- MOORE Building, St. Paul

A. M. BULL Instructor in Drawing.	St. Anthony Park
MARY BULL Instructor in Domestic Science.	St. Anthony Park
ANNA M. BUTNER Instructor in Physical Culture.	1915 Portland Ave.
FREDERICK K. BUTTERS, M. S. Instructor in Botany and Practical Pharmacognosy.	Minneapolis
LEROY CADY, B. Agr. Instructor in Horticulture.	St. Anthony Park
R. A. CAMPBELL, M. D. Clinical Instructor in Rhinology and Laryngology.	Century Building, St. Paul
HENRIETTA CLOPATH Instructor in Drawing.	701 Delaware St.
LILLIAN COHEN, M. A. Instructor in Chemistry.	415 Fourteenth St. E.
A. R. COLVIN, M. D. Clinical Instructor in Surgery	Lowry Arcade, St. Paul
WILLIAM H. CONDT, B. S., M. D. Instructor in Therapeutics.	Andrus Building
GEORGE M. COON, M. D. Clinical Instructor in Genito-Urinary Diseases.	Lowry Arcade, St. Paul
JOHN M. COULTER, M. A. Instructor in Economics.	Minneapolis
NORMAN J. COX, B. S., D. M. D. Instructor in Operative Dentistry.	Masonic Temple
JOSEPHINE CRAIG Instructor in Agricultural Chemistry.	St. Anthony Park
J. GROSVENOR CROSS, B. S., M. D. Clinical Instructor in Medicine.	Pillsbury Building
ALVIN S. CUTLER, C. E. Instructor in Railway Engineering.	Minneapolis
J. M. DAMON, D. D. S. Instructor in Prosthetic Dentistry and Dental Anatomy.	Minneapolis
WARREN A. DENNIS, B. S., M. D. Clinical Instructor in Surgery.	Lowry Arcade, St. Paul
CHARLES F. DIGHT, M. D. Instructor in Pharmacology.	Minneapolis
J. M. DREW Instructor in Blacksmithing and Poultry, Registrar of the School of Agriculture.	St. Anthony Park
A. W. DUNNING, M. D. Clinical Instructor in Nervous and Mental Diseases.	Endicott Arcade, St. Paul
R. E. FARR, M. D. Clinical Instructor in Surgery.	Syndicate Block
OSCAR W. FIRKINS, M. A. Instructor in English.	1523 Fourth St. S. E.
FRANCIS C. FRARY, M. S. Instructor in Chemistry.	Minneapolis
W. H. FRAZIER, B. S. Instructor in Agricultural Chemistry and Soils.	St. Anthony Park
JAMES GILFILLAN, M. D. Clinical Instructor in Medicine.	Minneapolis
HALDOR B. GIBLASON, B. A., LL. B. Instructor in Rhetoric.	Minneapolis
H. S. GODFREY, D. M. D. Instructor in Operative Dentistry.	Syndicate Block
JUDG GOODRICH, M. D. Clinical Instructor in Surgery.	Lowry Arcade
ROBERT L. GREEN, D. D. S. Instructor in Operative Dentistry.	Minneapolis
FRANK F. GROUT, B. S. Instructor in Mineralogy.	Minneapolis
GEORGE D. HAGGARD, M. D. Instructor in Physiology.	Pillsbury Building
ARTHUR S. HAMILTON, B. S., M. D. Instructor in Pathology of the Nervous System.	600 Washington Ave. S. E.
JOHN A. HANDY, Ph. C. Instructor in Chemistry	124 State St. S. E.
EARLE R. HARE, B. S., M. D. Instructor in Anatomy	327 Fourteenth Ave. S. E.

MARY V. HARTZELL, D.M.D.	Andrus Building
Instructor in Comparative Dental Anatomy.	
ROWLAND HAYNES, M.A.	606 7th St. S. E.
Instructor in Psychology.	
U. E. HEDDY, D.D.S.	710 21st Ave. S.
Instructor in Operative Technics.	
T. L. HINCKLEY, B.S.	Minneapolis
Instructor in Civil Engineering.	
P. A. HOFF, M.D.	Lowry Arcade, St. Paul
Clinical Instructor in Medicine.	
CHARLES M. HOLT, B.A.,	Waverly Hotel
Instructor in Education.	
OLAF HOVDA, B.S.	Minneapolis
Instructor in Engineering Mathematics.	
ANNAH H. HURD, Phm.D., M.D.	Pillsbury Building
Lecturer on Diseases of the Blood and Ductless Glands.	
C. E. INGBERT, M.D.	Minneapolis
Associate in Neurology.	
H. W. JONES, M.D.	2418 W. Twenty-Second St.
Clinical Instructor in Nervous and Mental Diseases.	
LEULAH H. JUDSON, B.A.	901 Sixth St. S. E.
Instructor in History.	
HENRY J. KESNER	1625 University Ave. S. E.
Instructor in Structural Engineering.	
A. R. KOHLER, B.S.A.	St. Anthony Park
Instructure in Horticulture.	
ALOIS F. KOVARIK, M.A.	1523 Seventh St. S. E.
Instructor in Physics.	
*DAVID LANDO, M.D.	Moore Building, St. Paul
Clinical Instructor in Medicine.	
W. F. LASBY, B.S., D.D.S.	Minneapolis
Instructor in Technics.	
ARTHUR A. LAW, M.D.	Pillsbury Building
Instructor in Operative Surgery.	
J. F. LEMSTROM, M.D.	Minneapolis
Instructor in Histology and Embryology.	
CHARLES N. MCCLOUD, Phm.D., M.D.	965 Selby Ave., St. Paul
Lecturer on First Aids to the Injured.	
JEANETTE M. McLAREN, M.D.	441 Selby Ave., St. Paul
Clinical Instructor in Obstetrics.	
J. S. MACNIE, M.D.	Minneapolis
Clinical Instructor in Diseases of the Eye and Ear.	
LINDA H. MALEY, B.L.	613 Washington Ave. S. E.
Instructor in Rhetoric.	
JAMES E. MANCHESTER, Sc.D.	405 Oak St. S. E.
Instructor in Mathematics.	
JOHN V. MARTENIS, M.E.	Minneapolis
Instructor in Machine Design.	
HERMAN A. MAVES, D.D.S.	Minneapolis
Instructor in Operative Dentistry.	
CARL M. MELOM, M.A.	506 Fifteenth Ave. S. E.
Instructor in French and Spanish.	
HUGH V. MERCER, LL.D.	327 Sixth Ave. S. E.
Lecturer on Jurisprudence.	
CHARLES W. NICHOLS, M.A.	Minneapolis
Instructor in Rhetoric.	
WALLACE NOTTESTEIN, Ph.D.	Minneapolis
Instructor in History.	
OSCAR OWRE, M.D.	Minneapolis
Instructor in Oral Surgery.	
E. C. PARKER, B.Agr.	St. Anthony Park
Instructor in Agriculture.	
PETER PETERSON	710 Nineteenth Ave. S.
Instructor in Foundry Practice.	
RAYMOND V. PHELAN, Ph.B.	219 Church St. S. E.
Instructor in Economics.	
JAY N. PIKE, D.D.S.	Masonic Temple
Instructor in Prosthetic Dentistry and Dental Anatomy.	
EDWARD QUIGLEY	Minneapolis
Instructor in Forge Work.	

WALTER R. RAMSEY, M.D. Clinical Instructor in Diseases of Children.	115 Lowry Arcade, St. Paul
JEAN RANKIN Instructor in Education.	916 5th St. S. E.
SOREN P. REES, B.S., M.D. Instructor in Physical Diagnosis and Clinical Medicine.	Andrus Building
H. M. REID, D.D.S. Instructor in Prosthetic Dentistry.	2014 Queen Ave. S.
WILLIAM H. RICHARDS Instructor in Carpentry and Pattern Work.	Minneapolis
HARRY P. RITCHIE, Ph.B., M.D. Clinical Instructor in Diseases of Women.	Lowry Arcade, St. Paul
H. B. ROE Instructor in Mathematics.	St. Anthony Park
BERT A. ROSE Instructor of Cadet Band.	41 S. Sixth St.
NORMAN W. ROSE, M.E. Instructor in Drawing.	209 State St. S. E.
FRANK B. ROWLEY, B.S., M.E. Instructor in Drawing.	Minneapolis
A. G. RUGGLES, M.A. Instructor in Entomology.	St. Anthony Park
WILLIAM RYAN, E.E. Instructor in Electrical Engineering.	Minneapolis
J. FRANCIS SCHEFCIK, B.S., Ph.G., M.D., C.M. Instructor in Materia Medica	Masonic Temple
THEOPHILUS SCHROEDEI. Instructor in German.	Minneapolis
C. SCHROEDER. Instructor in Animal Husbandry.	St. Anthony Park
JULIUS PARKER SEDGWICK, B.S., M.D. Instructor in Physiological Chemistry.	Andrus Building
W. D. SHELDON, M.D. Clinical Instructor in Medicine, and Instructor in Therapeutics.	Andrus Building
JUNIATA SHEPPERD, M.A. Instructor in Cooking, Laundering and Home Economics.	St. Anthony Park
S. CARL SHIPLEY, B.S. Instructor in Machine Work.	Minneapolis
CHARLES F. SHOOP, B.S. Instructor in Mechanical Engineering.	209 State St. S. E.
ROYAL R. SHUMWAY, B.A. Instructor in Mathematics.	602 Essex St. S. E.
NORMAN M. SMITH Assistant in Clinical Medicine and Physical Diagnosis.	3000 Hennepin Ave.
CHARLES N. SPRATT, M.D. Clinical Instructor in Diseases of the Eye and Ear.	Syndicate Arcade
THOMAS W. STUMM, M.D. Clinical Instructor in Medicine.	394 Selby Ave., St. Paul
SAMUEL E. SWEITZER, M.D. Clinical Instructor in Dermatology and Genito-Urinary Diseases.	1729 Irving Ave. S.
HENRY UBRICH Instructor in Carpentry.	Minneapolis
HENRY L. ULRICH, M.D. Assistant in Clinical Microscopy.	519 First Ave. S.
J. A. VYE Instructor in Farm Accounts and Secretary of the Experiment Station.	St. Anthony Park
J. A. WATSON, M.D. Clinical Instructor in Diseases of Nose and Throat.	Andrus Building
AMOS S. WELLS, B.A., D.D.S. Instructor in Prosthetic Dentistry and Dental Anatomy.	Andrus Block
ANDREW J. WEISS Instructor in Technics.	3705 Stevens Ave.
H. B. WHITE, B.S.A. Instructor in Farm Structures and Farm Mechanics.	St. Anthony Park
NELLIE A. WHITNEY, B.A. Instructor in Rhetoric.	Minneapolis
GRACE B. WHITRIDGE Instructor in Physical Culture.	St. Anthony Park
VAN H. WILCOX, M.D. Instructor in Operative Surgery.	812 Pillsbury Building

A. D. WILHOIT, M.A.

Minneapolis

Instructor in Agriculture

CHARLES WILLIAMS, M.A.

312 Union St. S. E.

Instructor in German.

ARCHIE D. WILSON, B. Agr.

St. Anthony Park

Instructor in Agriculture.

FRANK R. WRIGHT, D.D.S., M.D.

713 Pillsbury Building

Clinical Instructor in Dermatology and Genito-Urinary Diseases.

FRED S. YEAGER, D.D.S.

Minneapolis

Instructor in Crown and Bridge Work .

• Died May 18, 1908.

III

EQUIPMENT

Equipment

GROUND AND BUILDINGS

The twenty-three buildings of the University used by all departments of instruction save that of agriculture, are located upon the University campus, a tract of about fifty-five acres lying between University avenue and the river and between Eleventh and Nineteenth avenues southeast. The campus is well wooded with a fine grove of native oaks and commands a beautiful view of St. Anthony Falls and the city, but is sufficiently removed from the business center to insure desirable quiet and retirement. At the last session of the legislature provision was made for the expenditure of four hundred fifty thousand dollars in campus enlargement during the course of the years 1907-1909. Private benefactors have added fifty thousand dollars to that amount. Condemnation proceedings are now in progress for the purpose of obtaining the land desired. About thirty additional acres situated to the south of the present campus will probably be secured. The Department of Agriculture, including the college and school of agriculture, has a separate campus at St. Anthony Park, where are located the twenty-five buildings provided for this department and the state experiment station. Adjoining this campus is the University farm of about four hundred twenty acres.

ASTRONOMICAL OBSERVATORY

The students' astronomical observatory contains a ten and one-half inch refracting telescope furnished with a third lens for converting it into a photographic telescope; a filar micrometer; a spectroscope by Brashear; a students' meridian circle and zenith telescope; a Repsold photographic measuring machine, a chronograph, and astronomical clocks.

GYMNASIUM

The gymnasium is located in the Armory, and is well equipped with a variety of gymnastic appliances. The object of the gymnasium is to provide all of the students of the University opportunity for exercise to build up their general health. It also provides special training to correct physical defects and functional derangements. The gymnasium is in charge of a professional medical director and assistant, and the

training is under their direct supervision. A thorough physical examination is offered each student immediately before and after the gymnasium course, and a record is made of the same. The examination of these records shows a marked improvement in the standard of health of the average student during his college course. The gymnasium is open at all times to all young men in the University who are free to use the apparatus and to pursue a course of physical training under the direct supervision of the director and his assistant. In some of the colleges of the University, this work is required of all men.

MILITARY DRILL

The Act of Congress of 1862, providing for the establishment of "Land Grant Colleges," requires that instruction be given in military science and tactics at all institutions that are its beneficiaries. The armory is located on the University campus and has all the facilities usually provided in a modern armory. The United States government supplies the University with the necessary arms, equipment and ammunition for instruction in infantry and artillery drill, and details a commissioned officer of the regular army to take charge of the department.

THE ONE-MILE LIQUOR LAW

A state law provides that "it shall be unlawful for any person to sell or dispose of any spirituous, vinous, or malt liquors within the distance of one mile of the Main Building of the University of Minnesota, as now located in the city of Minneapolis; provided that the provisions of this section shall not apply to that part of the city of Minneapolis lying on the west side of the Mississippi River."

ATHLETIC ORGANIZATIONS

The ATHLETIC ASSOCIATION is an organization having for its object the general physical well-being of the students and the encouragement of a proper spirit in favor of hearty, manly sports.

Board of Control for Athletics. The athletic sports of the University are under the supervision of a board of control made up of eleven members; two are members of the faculty, two are alumni, and seven are students. This board arranges the schedule of games, manages the finances, and exercises a general supervision over all matters connected with athletic contests. It has charge of the whole of the athletic grounds of the University, Northrop Field. This field, containing about six acres, lies immediately adjoining the armory. It contains a modern cinder track, baseball diamond, and football gridiron. The grand stands have a seating capacity of about fifteen thousand. A large portion of this field was a

gift to the University from the heirs of the late John S. Pillsbury, and the brick wall surrounding it is the gift of his son, Mr. A. F. Pillsbury. It is generally conceded to be one of the finest fields in the West.

MUSEUMS AND COLLECTIONS

The museums of the University contain material obtained from various sources, arranged with special reference to its use for illustration. Among the more notable collections are the following:

(a) *In Geology and Mineralogy.* The Kunz collection of minerals, purchased of George F. Kunz; several suits of crystalline rocks secured from various sources; the Ward collection of casts contributed in part by citizens of Minneapolis; collection of rocks, fossils, minerals and economic products of Minnesota; upwards of 9,000 entries gathered by the geological survey of the State; the Sardeson collection of paleozoic fossils of Minnesota, Wisconsin, Iowa, and neighboring states, comprising 30,000 specimens; a series of 3,000 thin sections of typical rocks and minerals largely representing Minnesota localities; purchased material comprising a fine collection of crystals; 5,000 minerals and 3,000 specimens of economic minerals and crystalline rocks, and a collection of over 4,000 photographs and lantern slides.

Mr. Arus S. Williams, of Minneapolis, has given to the University his extensive collection of negatives and photographs. During many years of active work as a photographer, he has collected a series of several thousand plates representing geologic and geographic subjects, commercial views and historic scenes. These will prove of great value in illustrating the physical, commercial and political history of the State. They are to be recognized as the A. S. Williams collection of Photographs and Photographic Negatives.

(b) *In Zoology.* All the material collected by the State Zoologist; a collection of mounted Minnesota birds representing about one-third of the species found in the state; a number of the mammals of the state and a few from the more western states; a collection of fishes, molluscan shells, corals and other foreign material.

The ornithological room contains the excellent Thomas S. Roberts and Franklin Benner collection of skins, nests and eggs of Minnesota birds. Other groups of animals are more or less numerously represented, and are receiving annual additions from the Zoological Survey.

(c) *In Botany.* The general herbarium numbering about 400,000 specimens and comprising the series of plants collected by the state botanist; an alcoholic collection of material for dissection; a collection of woods of Minnesota; a limited series of carboniferous and cretaceous fossil plants, including the Lesquereaux collection from the Minnesota River localities.

(d) *In Technology.* A cabinet of specimens illustrating the products and processes of applied chemistry is being collected by the professor of chemistry, as opportunity offers. The collection embraces fuel, ores, furnace products, textile materials, both raw and manufactured, dye-woods and other materials used in dyeing; specimens illustrating the bleaching and printing of cotton, linen and woolen goods, earthenware, pottery, etc.

(e) *In Classics.* Some material illustrating classical geography, topography, chronology, mythology, archaeology, and art has been collected, consisting mainly of plans and charts, casts, pictorial illustrations, fac-similes of manuscripts and inscriptions.

(f) *In English.* A few fac-similes of manuscripts, plates that may serve the purpose of archaeological instruction, publication of texts, reprints of blackletter books and of original editions, photographs and portraits have been gathered.

(g) *In Civil Engineering.* The department is collecting samples of road material typical of the various localities of the State, and leading materials used in street paving, such as granite, trap rock, brick and asphaltum. A set of standard sections of steel and wrought iron is provided for illustration in the study of structural design.

(h) *In Mechanical Engineering.* The collection consists of models of mechanical motions especially relating to the work in kinematics; sectioned apparatus, such as injectors, water meters and steam separators; various collections of drop forging in iron, steel and copper; miscellaneous samples of commercial work representing the product of special machines; groups of standard nuts, bolts and screws; samples of belting, ropes, steel and iron cables, rawhide gears, and other material especially useful for illustrative purposes.

(i) *In Electrical Engineering.* This museum contains a growing collection of samples furnished by various manufacturers and dealers for demonstrating the merits of different products and for illustrating modern practice; an excellent collection showing the development of electrical instruments, lightning arresters, switches, primary and secondary batteries, early forms of dynamos and motors, lighting apparatus and various industrial applications of electricity; also a collection of samples from repair shops and elsewhere, illustrating the effects of wear, accidents and abuse.

(j) *In Engineering Mathematics.* This department has recently added to its apparatus used for illustration in teaching, several types of slide-rules, including those of Thatcher, Faber, Keuffel and Esser, Schureman's Computer, Boucher's Calculator; also Amsler's Polar Planimeter.

(k) *In Mathematics.* The Schroeder wooden and the Schilling gypsum, string and paper models for Solid Analytical Geometry, many of the Schilling models for illustrating the Theory of Surfaces, several of

the Schilling mechanical devices for describing various loci, the Keufel and Esser models for Solid Geometry, and large slated globes, suitably mounted, for use in Spherical Geometry and Spherical Trigonometry.

LIBRARIES.

The University Library consists of:

1. The general library.
2. The college libraries, including those of law, medicine, engineering, agriculture, and mines.
3. The departmental libraries, including those of arts, astronomy, animal biology, botany, chemistry, French, geology, German, Greek, Latin, mathematics, military science, physics, rhetoric, Scandinavian.

The whole number of bound volumes owned by the University is about one hundred and twenty thousand, unbound books and pamphlets about twenty thousand. About seven hundred and thirty current periodicals are received.

The general library is open to students and the public from eight A. M. to ten P. M. except Sundays and legal holidays.

The departmental libraries are designed especially for the work of their respective departments and consist mainly of books of reference and current periodicals relating to technical subjects. The private collections of the professors are usually available upon application when necessary for research.

Besides the University library the following libraries are easily accessible: the Minneapolis public library, containing over one hundred and sixty thousand bound volumes and over fourteen hundred of the leading newspapers, magazines and periodicals of the world; the St. Paul public library with about ninety-five thousand volumes; the Minnesota Historical Society library of about eighty-five thousand volumes and the state library of about fifty-nine thousand volumes in the capitol in St. Paul; the Minnesota Academy of Natural Sciences library of twelve thousand titles

IV

ORGANIZATIONS
AND PUBLICATIONS

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Student Organizations and Publications

RELIGIOUS ORGANIZATIONS

THE STUDENTS' CHRISTIAN ASSOCIATION was organized in 1869, its object being to promote growth in Christian character, and to engage in such religious work as may be deemed expedient and necessary. The association owns a commodious building, which serves as the headquarters for student religious activity. All persons in sympathy with the object of the association are eligible to membership.

THE YOUNG MEN'S CHRISTIAN ASSOCIATION has as its object the promotion of "growth in grace and Christian fellowship among its members and aggressive Christian work, by and for students." This association leases the Students' Christian Association building and keeps it constantly open, with a general secretary in charge. All men in sympathy with the object of the association are eligible to membership. This building is maintained as the social and religious headquarters of all young men in the University.

This association provides an employment bureau whose services are free to students in all departments of the institution, as well as a committee to help students to find comfortable rooms and boarding places. The association also maintains an educational department in which students may make up their entrance conditions at a nominal charge for instruction. The general secretary will be pleased to correspond with any young man intending to come to the University. Any inquiry about board, room, employment, or general information will gladly be answered, and a hand-book will be sent to anyone wishing it. Address the general secretary of the Young Men's Christian Association, University of Minnesota, Minneapolis, Minnesota.

THE YOUNG WOMEN'S CHRISTIAN ASSOCIATION is the center of Christian life among the young women of the University. Its object is "to deepen spiritual thought in the University woman, to environ her with a semblance of home, to bring to her friendship, assistance and sociability by stimulating student fellowship, to give her personal help when necessary; thus developing in her the Christ ideal of culture in womanhood."

To this end frequent socials and informal teas are given throughout the year; twice each week twenty-minute prayer meetings are held; a dozen circles meet one hour a week for devotional Bible study; and

from time to time missionary meetings are held. The general secretary devotes all of her time to the association and will be pleased to correspond with any young woman who wishes information regarding the University.

All young women are invited to visit the Young Women's Christian Association room before registering. Women from the upper classes will be there during the opening days to give advice and assistance.

THE UNIVERSITY CATHOLIC ASSOCIATION was organized by the Catholic students in the spring of 1900. The purpose of the association is the study of the Bible and of the doctrines and history of the Catholic Church. Membership is open to any one connected with the University. Regular meetings are held every Sunday afternoon in the rooms of either the Young Men's or Young Women's Christian Association, through the courtesy of these organizations. The association is planning to erect a building on or near the campus at an early date.

Aside from the religious objects, the association tends to promote good fellowship among its members. Early in each University year a reception is tendered to new students and during the year two or more socials are held. Further information may be obtained by addressing the secretary of the association at the University.

LITERARY, SCIENTIFIC, AND MUSICAL ORGANIZATIONS

PHI BETA KAPPA.—A chapter of the honorary society of *Phi Beta Kappa* was established at the University in 1892. A small proportion of the graduates of the College of Science, Literature, and the Arts are elected to membership each year. Election is based upon high scholarship and character.

SIGMA XI.—A chapter of the honorary scientific society of *Sigma Xi* was established at the University in 1896. A small proportion of the graduates of the scientific and technical departments are elected to membership each year. Election is based upon high scholarship and character.

THE GRADUATE CLUB is a club organized for the purpose of fostering a greater interest in graduate work, for mutual help, and for discussion of topics under investigation.

THE MINNESOTA LITERARY UNION is a federation of the members of the following societies: Shakopean, Forum, Castalian, Minerva, and Arena. Four meetings are held each year.

LITERARY SOCIETIES.—The above named literary societies are mainly debating clubs. Every student is welcome to attend the literary sessions, but the business sessions are usually held behind closed doors. Students desiring to join should make early application to some member of the society he prefers, as the membership is limited. Membership limit: *Shakopean*, 35, men; *Forum*, 30, men; *Minerva*, 30, women; *Late Literary*,

unlimited, law students; *Castalian*, 35, men; *Theta Epsilon*, 30, women; *Thalian*, 25, women; *Acanthus*, 30, women.

THE DEBATING BOARD has charge of home and inter-collegiate oratorical contests.

THE NORTHERN ORATORICAL LEAGUE is composed of the oratorical associations of the University of Michigan, Northwestern University, the University of Wisconsin, Oberlin College, the State University of Iowa, the University of Chicago, and the University of Minnesota. Its purpose is to foster an interest in public speaking and to elevate the standard of oratory by holding annual contests. The contests are open only to undergraduates.

THE DRAMATIC CLUB is organized for the study and practice of dramatic art.

THE GLEE AND MANDOLIN CLUBS give a public concert each year at the University and make a tour of the state during the holidays.

THE UNIVERSITY BAND is organized as a part of the military system of the University and is composed of about sixty musicians. It is under the efficient leadership of an instructor in music, and furnishes music for military and many other University affairs.

THE SOCIETY OF ENGINEERS meets once in two weeks to listen to addresses by prominent engineers and for the discussion of various engineering topics. The Year Book of this society is published annually. It is devoted to the publication of articles upon engineering subjects by professors and students.

THE MINNESOTA SECTION OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS meets monthly in St. Paul and Minneapolis alternately. Students of the College of Engineering are welcome at these meetings.

THE GRANGE is comprised of the members of the faculty of the Department of Agriculture and others connected with the institution and interested in its welfare. Meetings are held on the first and third Monday evenings of each month. The order is intended to bring those connected with the College and Station in closer touch with one another and with the many lines of work carried on in the several divisions. Its further purpose is to keep in closer touch with the scientific world and the grange work of the state and nation.

PHILONETHIAN LITERARY SOCIETY is an organization of the students of the College of Agriculture, its object being to train its members in the art of public speaking, debating and parliamentary practice. The society meets once a week and presents a program including readings, recitations, debates, etc. The membership is limited to forty and is only for students in the College of Agriculture.

THE FORESTRY CLUB was organized by the Forestry students for the promotion of good fellowship and mutual interests. The specific object

of the club is to keep the members up to date on Forestry Literature and current affairs in the lumber world.

WOMEN STUDENTS

After June first, 1908, the Registrar will supply a list of recommended boarding and rooming places to any women requesting such information. Young women who wish to earn a part of their expenses may generally learn of opportunities by communicating with Miss Ada Comstock, Dean of Women. During the college year Miss Comstock holds office hours every week day in the council room in Alice Shevlin Hall. At such times she welcomes any woman student who cares to come to her whether for advice, information, or an informal talk.

During the summer Miss Comstock's address is Moorhead, Minnesota. She will be glad to correspond with young women who are planning to enter the University or with their parents.

SHEVLIN HALL. Through the generosity of Hon. Thomas H. Shevlin, the University now possesses in Alice Shevlin Hall a building admirably designed and equipped for the use of its women students. It is a two-story and basement structure, the material used being pressed brick with stone trimmings. It has a frontage of one hundred and fourteen feet on Pillsbury avenue and a depth of fifty-five feet. The purpose of this building is to furnish suitable rest and study rooms for the women attending the University. The building contains several society rooms, a large lunch room, and a general reception hall.

THE STUDENT GOVERNMENT ASSOCIATION FOR WOMEN. This organization was formed for the purpose of aiding in the care and conduct of Alice Shevlin Hall. Every woman student in the University is regarded as a member. There are no dues. The association makes rules for the guidance of those using Alice Shevlin Hall; it provides committees to enforce the rules; it gives permission for the holding of social functions in the building; and it controls the expenditure of any surplus in the receipts from the lunch room.

THE WOMAN'S LEAGUE. This organization is open to all women who are students in the University. It is governed by a council made up of student members from the four college classes. It makes its headquarters in the council room in Alice Shevlin Hall. The aim of the organization is to promote good fellowship and sociability among the women of the University. For this purpose it gives receptions and parties for girls at regular intervals throughout the year. It also endeavors to aid in any project which may be of benefit to the University, and particularly to the women students. At present it is interested in the attempt to secure

PUBLICATIONS

THE MINNESOTA DAILY is published five times each week during the University year by an organization of University students.

THE JUNIOR ANNUAL, called *The Gopher*, is a book published annually by the junior class of the University.

THE MINNESOTA MAGAZINE is a monthly magazine devoted to the cultivation of literary taste and effort among the students of the University. It is managed by a board of editors chosen from the senior class.

THE MINNE-HA-HA is a humorous monthly magazine, published by the students of the University. It depicts life upon the campus in a satirical vein. The board of editors consists of ten members, chosen from the student body.

THE MINNESOTA ALUMNI WEEKLY is published every Monday during the University year. The Weekly is published entirely in the interest of the alumni and is devoted to alumni news and such University news as may be of special interest to the alumni.

THE YEAR-BOOK OF THE SOCIETY OF ENGINEERS is published annually. It is devoted to the publication of articles upon engineering subjects by professors and students.

FORESTRY PUBLICATION.—The "Minnesota Forester" is the official organ of the Minnesota State Forestry Association. It is edited by the Forestry Department of the University and is devoted to the advancement of the forestry movement with special emphasis on farm forestry.

FARM STUDENTS' REVIEW.—This is a paper published and managed by the Alumni Association of the School of Agriculture. It is the official organ of the Alumni Association and the Farmers' Club. The *Review* is intended to be a medium through which former students may keep in touch with the Agricultural School and with one another. It also endeavors to bring the farmers of the State into closer touch with the school, the college and the Experiment Station. To this end, the paper strives to present the latest progress in the experimental work of the various stations and to call attention to the most practical farm practices.

SCHOLARSHIPS AND PRIZES

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Scholarships and Prizes

ASSISTANTS, SCHOLARSHIPS, LOANS AND PRIZES

ASSISTANTS

It is the policy of the University to encourage graduate study and to provide for assistance in laboratories, reading of test and examination papers, supervision of note books, and similar services by the appointment of assistants in departments where such services are required. The general principles which now control the making of such appointments are: (1) the appointments are made by the board of regents, upon the nomination of the head of the department concerned and its ratification by the dean of the college; (2) appointments are for one year only, but may be renewed; (3) the appointees must be graduate students, who are taking work along the lines of the assistantships to which they are appointed; (4) assistants are not regularly placed in charge of classes, and when exceptions are made to meet emergencies, the arrangement is regarded as a temporary one, and in no case to extend beyond the current year.

SCHOLARSHIPS

The Moses Marston Scholarship in English

Friends and pupils of the late Professor Moses Marston have given one thousand dollars as a memorial fund. The annual income of the fund is to be used to help some student in the English course. The award of the income is made on the basis of pecuniary need and of deserving scholarship.

The Albert Howard Scholarship Fund

Under the last will and testament of Mr. James T. Howard, of the town of St. Johnsbury, Vermont, \$4,166.81 was left to the University to establish a scholarship to be known as the Albert Howard Scholarship. This scholarship is assigned by the executive committee of the board of regents upon the recommendation of the faculty.

The College Women's Club Scholarship

The College Women's Club of Minneapolis has established a scholarship for the benefit of women students in this University. For the year

1908-9 this scholarship amounts to \$150. In awarding it the preference will be given to students in the junior and senior classes and to graduate students. Application for this scholarship may be made to Miss Comstock, Dean of Women.

STUDENT LOAN FUNDS

The Gilfillan Trust Fund

The Hon John B. Gilfillan has given to the University the sum of fifty thousand dollars, yielding an annual income of two thousand dollars, to be used by the board of regents to assist worthy students, needing such aid, to secure an education. The regents are empowered to give this aid in the way of loans or gifts, according to the circumstances of the case. As a rule the fund is used as a loan fund, and a small rate of interest is charged. The details of the regulations which have been adopted by the regents for the administration of the fund may be learned by addressing the President of the University.

The Elliot Scholarship Loan Fund

To fulfill the wish of the late Dr. A. F. Elliot to aid young men who find their efforts to obtain a practical education embarrassed through lack of means, the sum of \$5,000 was placed in the hands of the Board of Regents as a scholarship fund. The income from this fund is loaned students in the School of Mines on the following conditions:

The financial needs of the applicant, his scholarship, moral character, enthusiasm shown in his work and promise of usefulness in his profession. When money is available it may be loaned to pay expenses of worthy students during sickness. The loans are to be repaid, without interest, at the earliest convenience of the recipients.

The Puritan Colony Scholarship Loan

The Puritan Colony of the National Society of New England Women has established a loan fund for women students in the University. For the year 1908-9 this scholarship loan amounts to one hundred dollars. It is available for women students of New England birth or ancestry. In awarding it the preference will be given to young women in the junior and senior classes. Application for it may be made to Miss Comstock, Dean of Women.

Armour Scholarships

Through the exhibits of live stock at the International Exposition in 1907, the College of Agriculture has been awarded two of the J. Ogden Armour scholarships. Each scholarship amounts to \$250.00 and is to be awarded to a worthy student in the Agricultural College. These scholar-

STUDENTS' TRUST FUND.

The class of 1902 left with the School of Agriculture a fund of \$100 "to assist by temporary loans at a reasonable rate of interest, deserving students needing such help, who are not below the B class in the School of Agriculture." This fund is in charge of a committee consisting of the secretary, the principal, the preceptress, and the president of A class.

THE LUDDEN TRUST.

The Honorable John D. Ludden, of St. Paul, gave the University of Minnesota \$5,000 to be held, invested and re-invested by the University, through its Board of Regents, and the income thereof to be collected, received and applied by said Board of Regents to the financial assistance of students of either sex in the school of agriculture. Mr. Ludden delivered into the hands of the regents for the principal sum one Northern Pacific registered prior lien railway land grant gold bond of the denomination of \$5,000, payable to the University of Minnesota and its assigns in gold coin, on the first day of January 1997, with interest at 4 per cent per annum, payable quarter-yearly in like gold coin, the fund to remain so invested until the bond matures, unless by reason of changed conditions a re-investment shall be sooner deemed judicious by the Board of Regents for the safety, conservation or continued productiveness of the fund. The premium on the purchase of this first grade security was \$212.50, and was paid by Mr. Ludden, thus enlarging his donation by that amount.

Mr. Ludden imposes the following conditions: "The beneficiaries must be youths who are residents of the state of Minnesota; they must be and continue of unblemished moral character, and of temperate and industrious habits, and they must be such as by examination and trial shall evince and maintain a taste, habit and aptitude for study and improvement; and any student who shall fail to come, or shall cease to be, within the above conditions shall forfeit all claims to the benefit of such fund. Subject to these conditions the administration of such income is entrusted to the said board of regents, which may make such rules therefor as they may deem judicious."

This fund produces \$200 a year. Those wishing to avail themselves of its benefits should apply to the executive committee of the Board of Regents of the University of Minnesota.

Mr. Ludden has since donated another \$5,000 for a like purpose so that the yearly income is now \$400.

PRIZES*The John S. Pillsbury Prize.*

Three prizes of one hundred, fifty, and twenty-five dollars each, offered by the heirs of the late John S. Pillsbury, are awarded for the best work in the department of rhetoric, as evidenced finally by an oration in public.

The '89 Memorial Prize in History

The class of 1889, at graduation, established a prize of twenty-five dollars each year, to be known as the '89 Memorial Prize, and to be given for the best thesis in history by a member of the graduating class. The award is made by a professor in history in some other institution.

The William H. Dunwoody Prize

Mr. William H. Dunwoody has provided a cash prize of seventy-five dollars for the members of the team winning the inter sophomore debate, and another prize of twenty-five dollars for the student in the sophomore class writing and delivering the best oration.

The Frank H. Peavey Prize

Mrs. Frank T. Heffelfinger continues the prize of one hundred dollars established by her father, the late Frank H. Peavey. This prize consists of seventy-five dollars for the members of the team winning the freshman-sophomore debate, and another prize of twenty-five dollars to the student in the freshman or sophomore class writing and delivering the best oration.

The James T. Wyman Prize

A prize of twenty-five dollars is offered by the Hon. James T. Wyman, of Minneapolis, through the department of economics and political science, for the best essay of three to five thousand words by an undergraduate student, on the subject of "The Influence of Immigration upon the Development of the Northwest."

The William Jennings Bryan Prize

The Hon. William Jennings Bryan has given the University the sum of two hundred dollars for the encouragement of studies in political science. The annual income will be given as a prize to the writer of the best essay upon a topic to be announced each year. The competition is open to all students of the College of Science, Literature, and the Arts.

The Frank O. Lowden Prize

The Hon. Frank O. Lowden, of Chicago, offers as a prize to be competed for by the Northern Oratorical League, an endowment of three thousand dollars, which will yield an annual income of about one hundred and seventy-five dollars. A prize of one hundred dollars will be given to the orator winning first place, fifty dollars to the orator winning second place, and the remainder will be set aside each year for an interest fund to accumulate, and, in time, produce another endowment.

The Rollin E. Cutts Prize in Surgery

Dr. Mary E. Smith Cutts, '91 Medical, has given to the University, as a memorial of her husband, Rr. Rollin E. Cutts, '91 Medical, the sum of \$500.00, the income from which is to be awarded in the form of a gold medal to that member of the senior class of the College of Medicine and Surgery who presents the best thesis showing original work upon a surgical subject.

VI ADMISSION

Admission

Admission to the colleges or schools of the University is either by certificate or by examination. For exception see pages 40-41, Bulletin of the College of Science, Literature, and the Arts. The candidate must offer fifteen year credits of high school work so chosen as to include those required for the college or school which he wishes to enter. Of these fifteen year credits prescribed for admission the six in list A are required for admission to the freshman class in all the colleges and schools of the University except the College of Pharmacy, and no substitutions are accepted.

LIST A

REQUIRED BY ALL COLLEGES

English	four years
Elementary Algebra	one year
Plane Geometry	one year

Certain of the nine additional credits required for admission are prescribed by individual colleges, as indicated in the following list, and in no case is substitution allowed.

REQUIRED BY INDIVIDUAL COLLEGES

College of Science, Literature, and the Arts

List A	6 credits
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See also page 31, Bulletin of the College of Science, Literature, and the Arts.

College of Engineering and the Mechanic Arts

List A	6 credits
Chemistry	1 credit
Higher Algebra	½ credit
Solid Geometry	½ credit
Language	2 credits

10 credits

College of Agriculture

For high school graduates, see requirements for admission to the College of Science, Literature and the Arts.

For graduates of the School of Agriculture see bulletin of the College of Agriculture.

School of Agriculture

See bulletin of the School of Agriculture.

College of Law

List A	6 credits
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College of Medicine and Surgery

List A	6 credits
Latin	2 credits
Higher Algebra	1½ credit
Solid Geometry	1½ credit

Two years of college work, to include the satisfactory completion of one year of at least three credit* hours per week, including laboratory, in each of the following named subjects:

- 1) Physics.
- 2) General Inorganic Chemistry.
- 3) Qualitative Analysis.
- 4) Biology, i. e. Zoology or Botany.
- 5) Language, i. e. German or French.

College of Homeopathic Medicine and Surgery.

See Table for Medicine and Surgery.

College of Dentistry

List A	6 credits
Latin	1 credit
Manual Training	1 credit
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8 credits	

College of Pharmacy

English	2 credits
Elementary Algebra	1 credit
Plane Geometry	1 credit
Physics	1 credit
Latin	2 credits
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7 credits	

*NOTE.—A credit hour is taken to be two or more hours of consec-

School of Mines

List A	6 credits
Higher Algebra	$\frac{1}{2}$ credit
Solid Geometry	$\frac{1}{2}$ credit

 7 credits
School of Analytical and Applied Chemistry

List A	6 credits
Higher Algebra	$\frac{1}{2}$ credit
Solid Geometry	$\frac{1}{2}$ credit

 7 credits
College of Education

Two years of collegiate work in any college or university of recognized standing.

Graduate School

See bulletin of that school.

THE REMAINDER OF THE FIFTEEN CREDITS MUST BE MADE UP FROM THE
SUBJECTS IN LIST B.

LIST B**Mathematics**

Higher algebra, one half year
Solid geometry, one half year

Latin

Grammar, one year
Caesar, four books, one year
Cicero, six orations, one year
Virgil, six books, one year

Greek

Grammar, one year
Anabasis, four books, one year

German

Grammar, one year
Literature, one year

French

Grammar, one year
Literature, one year

Spanish

Grammar, one year
Literature, one year

Swedish, Danish-Norwegian, Icelandic

Grammar, one year

History

Ancient to Charlemagne, one year

Modern, from Charlemagne, one year

England, one half year

Senior American, one half year

American Government, one half year

Business Subjects

History of commerce, one half year

Commercial geography, one half year or one year

Elementary economics, one half year

Business law, one half year

Business arithmetic, one half year

Elementary bookkeeping, one half year

Advanced bookkeeping and business practice, one year

Stenography and typewriting, two years

Business spelling and correspondence, one half year

Physics, one year

Chemistry, one year

Botany, one half or one year

Zoology, one half or one year

Astronomy, one half year

Geology, one half year

Physiography, one half year

Manual Subjects

Freehand drawing, two credits¹

Mechanical drawing, two credits¹

Shop work, two credits¹

Modeling and wood carving, one credit¹

Domestic art and science, two credits¹

ADMISSION BY CERTIFICATE

Graduates of the following courses, provided they present the credits required in List A, are admitted to the freshman class without conditions. For applicants under (a) or (b), all records shall be entered on the principal's certificate as "passed," "passed with credit," or "passed with honor." Each mark below "passed with credit" shall count as a condition unless a state high school board certificate shall be presented for the same subject. Beginning in September, 1909, this rule for admission shall be applied to all work completed after June, 1908. Until it goes into effect for the full four years' work, applicants will be admitted, provided

¹For explanation of the term *credit*, as here used, see the syllabi for manual subjects given on page 54.

they have not, on the average, more than one semester mark below "passed with credit" for each year subject to the rule. Entrance examination in English is required for admission to the College of Science, Literature and the Arts, and in mathematics for admission to the College of Engineering and the Mechanic Arts, and the School of Mines.

For more detailed information see the bulletins of the separate colleges.

- (a) Any four year course of a Minnesota state high school
- (b) A four year course of other accredited schools in the state
- (c) A four year course of schools in any other state accredited to the state university of that state
- (d) The advanced Latin or English course of the Minnesota state normal schools.

A candidate wishing to enter the University from an accredited school, should furnish the registrar an official statement of his preparatory work certified to by the principal of the school from which he comes. Blank certificates of admission for school year 1908-1909 may be secured from the registrar, and should be filled out and returned to him for approval before Aug. 25th, 1908. An applicant will be admitted conditionally who is deficient in not more than three half year credits (one year credit in the College of Engineering), and these entrance conditions must be removed before the beginning of the sophomore year.

ADMISSION BY EXAMINATION

Whenever admission is by examination, the candidate must pass examinations in the credits from list A, required for entrance to the college in question, and in addition sufficient credits from the list of electives in list B, to make a total of fifteen year credits; provided that, if the total of entrance conditions does not exceed three half year credits (in the College of Engineering one year credit), the applicant shall be admitted conditionally and be given one year in which to make up the entrance conditions.

PROGRAM OF ENTRANCE EXAMINATIONS

See Page 3.

LIST OF ACCREDITED SCHOOLS

The following High Schools are accredited:

Ada	Eveleth	Long Prairie	Royalton
Adrian	Excelsior	Luverne	Rush City
Aitkin	Fairfax	Lyle	Rushford
Albert Lea	Fairmont	McIntosh	St. Charles
Alden	Faribault	Mabel	St. Cloud
Alexandria	Farmington	Madelia	St. Louis Park
Amboy	Fergus Falls	Madison	St. James
Annandale	Fertile	Mankato	St. Paul—
Anoka	Fosston	Mantorville	Central
Appleton	Frazee	Mapleton	Cleveland
Argyle	Fulda	Marshall	Humboldt
Arlington	Gaylord	Mazeppa	Mechanic Arts
Atwater	Glencoe	Milaca	St. Peter
Austin	Glenwood	Minneapolis—	Sandstone
Barnesville	Graceville	Central	Sauk Centre
Belle Plaine	Grand Meadow	East	Shakopee
Bemidji	Grand Rapids	North	Sherburn
Benson	Granite Falls	South	Slayton
Bird Island	Hallock	West	Sleepy Eye
Blooming Prairie	Halstad	Minneota	South St. Paul
Blue Earth	Harmony	Montevideo	Springfield
Brainerd	Hastings	Montgomery	Spring Grove
Breckenridge	Hawley	Monticello	Spring Valley
Browns Valley	Hector	Moorhead	Staples
Buffalo	Henderson	Mora	Stephen
Caledonia	Herman	Morris	Stewartville
Cambridge	Heron Lake	Morton	Stillwater
Canby	Hibbing	Mountain Lake	Thief River Falls
Cannon Falls	Hinckley	New Prague	Tracy
Cass Lake	Hopkins	New Richland	Two Harbors
Chaska	Houston	New Ulm	Virginia
Chatfield	Howard Lake	Northfield	Wabasha
Chisholm	Hutchinson	North St. Paul	Wadena
Clarkfield	Jackson	Olivia	Warren
Cloquet	Janesville	Ortonville	Waseca
Cokato	Jordan	Osakis	Waterville
Cottonwood	Kasota	Owatonna	Welcome
Crookston	Kasson	Park Rapids	Wells
Dawson	Kenyon	Paynesville	West Concord
Delano	Kerkhoven	Pelican Rapids	Wheaton
Detroit	Lake Benton	Perham	White Bear
Dodge Center	Lake City	Pine City	Willmar
Duluth	Lake Crystal	Pine Island	Willow River
Central	Lakefield	Pipestone	Windom
Irving	Lake Park	Plainview	Winnebago
Eagle Bend	Lamberton	Preston	Winona
E. Grand Forks	Lanesboro	Princeton	Winthrop
Elbow Lake	Le Roy	Red Lake Falls	Worthington
Elgin	Le Sueur	Red Wing	Zumbrota
Elk River	Le Sueur Center	Redwood Falls	
Elmore	Litchfield	Renville	
Ely	Little Falls	Rochester	

The following private schools are also accredited to the University :

St. Mary's Hall, Faribault	St. Paul's College, St. Paul Park
St. Paul Academy	The Loomis School, St. Paul
Shattuck Military Academy,	The Backus School for Girls, St. Paul
Faribault	The College of St. Catherine, St. Paul
Stanley Hall, Minneapolis	St. Margaret's Academy, Minneapolis
Windom Institute, Montevideo	The Winona Seminary, Winona
Concordia College, Moorhead	St. John's College, Collegeville
Pillsbury Academy, Owatonna	Minnesota College, Minneapolis...
St. Joseph's Academy, St. Paul	

ADMISSION TO ADVANCED STANDING

I. FROM OTHER COLLEGES •

This University accepts records from all reputable colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in the college to which admission is sought. In bringing records from other institutions, the certificate must be upon the official blank of the institution granting the certificate, and should show :

- (a) The subject studied; if a language, the books read, etc.
- (b) The time spent upon each subject.
- (c) Ground covered in laboratory work in case of laboratory subjects.
- (d) The result. It is sufficient to state that the subject was completed creditably.

Records from institutions whose entrance requirements are not as high as those of this University will not be accepted for equivalent rank. The credits to be allowed in such cases will be determined by the Enrollment Committee of the college in question.

2. FROM MINNESOTA NORMAL SCHOOLS

Graduates of the "advanced graduate course" of a Minnesota State Normal School are admitted to the College of Science, Literature, and the Arts (see p. 40, bulletin of College of Science, Literature, and the Arts) with advanced standing equivalent to one year's credit.

Individual graduates of the "advanced Latin course" (five year) or of the "advanced English course" (five year) of a Minnesota State Normal School, who on the basis of maturity and ability, present certificates of special fitness from the president of the Normal School, will be admitted with advanced standing under the same regulation and proviso.

DESCRIPTION OF SUBJECTS ACCEPTED FOR ADMISSION

The following statements indicate in a general way the preparation which the University expects in the various subjects accepted for admission.

English (four years)

In order to secure a definite plan of study and unity of method on the part of preparatory schools, the entrance requirement in English is outlined below somewhat in detail. To satisfy this requirement a four-year course of not less than four hours per week must be pursued. The headings under which instruction will naturally fall are:

- (a) English classics
- (b) The principles of rhetoric
- (c) Practice in written expression

(a) English classics should include a critical reading, in class, of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's *Macbeth*; Milton's *Paradise Lost*, books one and two; Burke's *Conciliation with America*; Carlyle's essay on *Burns*. In the study of these works the student should know the leading facts connected with the author and his time; he should become familiar with the subject matter of the work and thoroughly at home with the story, and should have a clear idea of the form and structure of the work as a whole.

A less critical knowledge of other standard or classic works, which may perhaps be read by the student at home, with written reports and brief oral discussions in class, is desirable. The following works are noted as indicative of the minimum amount of work expected: at least two of Shakespeare's plays, beside the one read in class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, one of Webster's orations.

(b) The work in the principles of composition should include the principles and technical terms of ordinary texts upon the subject, whether acquired by the direct study of such texts or mainly by the study of selected English masterpieces. It should not be forgotten that this is not an end in itself, but simply a means of teaching the student the correct use of English.

(c) Not less than one hour each week throughout the four years of the high school course should be devoted to practice in written expression. The instructor may choose such topics as local conditions may require or make most profitable; but whatever line of work is pursued, the student should be taught to use language correctly and forcibly and learn to express himself clearly and logically in writing.

ELEMENTARY ALGEBRA (one year). Addition, subtraction, multiplication, division, factoring, highest common divisor, lowest common multiple, fractions, simple equations, with one, two, and several unknown quantities followed by problems, theory of exponents, involution (including the binomial theorem for positive integral exponents), evolution, radicals, inequalities, ratio, proportion, progression, and quadratic equations, with problems.

HIGHER ALGEBRA, FIRST PART (one-half year). While this subject does not include any topics not named under elementary algebra, a much fuller treatment of those topics is expected in this work. Principles as well as processes should be learned, theorems and rules should be

PLANE GEOMETRY (one year). Any of the standard texts on this subject will furnish the necessary preparation. Isoperimetry, symmetry and maxima and minima of figures are not required. The exercises requiring solutions and demonstrations should not be omitted.

SOLID GEOMETRY (one-half year). Any of the standard texts on this subject will furnish the necessary preparation. The exercises requiring solutions and demonstrations should not be omitted.

LATIN GRAMMAR (one year). This will include the subjects of orthography, etymology and syntax. Proficiency is particularly desired in the following subjects: the analysis of the verb forms, the rules of syntax, and the principal parts of the irregular verbs.

CAESAR (one year). First four books or selections from the seven books equivalent to four; or three books, with thirty pages of Cornelius Nepos, or two books with sixty pages of Cornelius Nepos. Special attention should be paid to the translation of passages of the text into correct and idiomatic English; grammatical questions connected with the text; more especially on the subjunctive mood, indirect discourse and the sequence of tenses. The student is expected to be familiar with the life of Caesar and an account of his wars.

CICERO (one year). Any six orations from the following list: *Against Catiline*, *Poet Archias*, *Ligarius*, *Marcellus*, *Manilian Law* (to count as two orations), the fourteenth *Phillipic*. The student should also be familiar with the life of Cicero.

VIRGIL (one year). Six books of the *Aeneid*, or five of the *Aeneid* and one of the *Metamorphoses* of Ovid, or the *Eclogues*. The student should be familiar with the life of Virgil and an account of his times and writings. A correct rythmical reading of the text is to be encouraged.

GREEK GRAMMAR (one year)

XENOPHON'S ANABASIS (one year)—Four books

GERMAN (two years)

First year the pupil should acquire:

- (1) A correct pronunciation, training of the ear, eye and organs of speech.
- (2) A vocabulary of a thousand words of every day use; facility in combining these words into simple sentences. As a means to this, 100 to 150 pages of easy narrative prose and poetry should be read, from which questions and answers may be formed. To test the student's memory and knowledge of the word-order he should relate or write out the story anew in his own words.
- (3) From two to three hundred German idioms.
- (4) The essentials of German grammar, to be taught by means of oral and written exercises based upon the reading lessons.

Second year:

- (1) Read one hundred and fifty to two hundred pages of prose and poetry.
- (2) Practice in reading smoothly and with expression.
- (3) Carefully translate selected passages of the text into idiomatic English. To translate easy sentences which the student already understands is a waste of time.
- (4) Translate sentences from English into German, using words and idioms of the text read.
- (5) Study topically German grammar; chief rules of orthography, etymology and syntax; illustrate these by words, phrases and sentences selected or composed by the student.

FRENCH (two years). The principles of French grammar, including acquaintance with the verb, regular and irregular; an ability to translate easy English sentences into French and simple French prose into English.

SPANISH (two years). First year, grammar and reader; second year, grammar reviewed; reading of some modern writer; composition and conversation.

ANCIENT HISTORY (one year).

- (a) This study should begin with from five to seven weeks upon the oriental peoples who have most influenced European development, noting the early civilizations in the valleys of the Nile and Eu-

phrates, the spreading and meeting of these civilizations in the intermediate region, with notice of the more important states in that district, and the union of the East under Persia. This survey should aim to give an idea of the reach of recorded history, of the distinguishing features of the successive oriental nations, and of their more important influence upon later European development.

(b) In the Greek and Roman age emphasis should be put upon the evolution of institutions, and considerable attention should be paid to the later Hellenistic period, after the rise of Macedon, and to the Roman Empire, with its bearing upon subsequent history. Some of the work should be illustrated by the use of sources, and maps should be used constantly.

(c) The subject should be carried down to the establishment of Charlemagne's empire. This will bring together all the chief lines of influence which were afterwards to make our modern world, will show the meaning of the preceding eras as can not be done if the study stops at an early date, and will leave the subject at a period of comparative order and simplicity.

MODERN HISTORY (one year). From Charlemagne to the present. The topics to which special attention are called are the period of disorder after Charlemagne and the consequent rise of feudalism, the Holy Roman Empire and the papacy, the medieval church, the crusades, the free cities, the rise of national monarchies, the intellectual renaissance and the protestant reformation, the French revolution and the subsequent democratic movements in politics and industry.

It is desirable to give at least half of the year to this last period from 1789.

ENGLISH HISTORY (one-half year). The Saxon period should be passed over rapidly. In the remainder of the work, besides the narrative, constitutional points should receive attention, and easily accessible documents, like Magna Charta, should receive careful study.

SENIOR AMERICAN HISTORY (one-half year). No attempt should be made to cover the whole field in this time. Either the colonial history or the period from 1783 to 1832 offers quite enough material. In any case, considerable use should be made of collections of documents, and sources.

AMERICAN GOVERNMENT (one-half year). This should be a study of our government, national, state and local, as it is organized and actually operated today. Students should be made familiar with the purpose and salient features of important instruments of government and other public acts like the Declaration of Independence, Articles of Confederation, the constitution of the United States, the constitution of Minnesota, and a local city or village charter.

In no case, however, should the instruction consist wholly or largely of an analysis of documents. It should rather aim to impart information essential to intelligent, active citizenship, such as the division of the government into departments, their organization and function; the methods of nominating, electing, and appointing men to office; of framing and amending constitutions, city charters and statutes; of drawing grand and petit juries and the duty of the citizen to serve on them; the distinction between common law, state law, and constitutional law, between equity, civil, and criminal cases.

To make the government seem a real working organization to the student, he should be encouraged to observe public proceedings by attending school meetings, town meetings, sessions of the county commissioners, city council, state legislature, a trial in court, and party primaries and conventions. He should also be led to read about and observe public affairs for himself. To that end let him collect statistics and accounts of work done by particular offices and departments from published reports and by personal inquiry.

BUSINESS SUBJECTS: The following syllabi are offered by the University in order that the schools may be informed concerning the preparation expected in business subjects, in view of the fact that the graduates of business courses are now admitted to the University on the same footing as the graduates of other courses.

It is not intended or expected that many schools, or perhaps any one school, will offer all the subjects indicated. Not to exceed forty per cent of the units for admission should in any case be taken from the list of technical business subjects named below. The

other sixty per cent should embrace the required English and mathematics, together with some work in history, science and the modern languages. The University is strongly of the opinion that no business course should be offered which does not include at least two years of some one modern language.

Under the head of business subjects are included two distinct lines of work: first, courses dealing with the history, description, theory and law of business, including the history of commerce, commercial geography, elementary economics and business law; second, courses dealing with the technique of business. The latter may be further subdivided into the mathematics of business, including business arithmetic, bookkeeping and business practice; and the language of business, including stenography, typewriting and business correspondence.

HISTORY OF COMMERCE (one-half or one year). The history of commerce forms the natural introduction to the study of present economic conditions. It would be well to give special attention to the economic history of England and the United States. The work should be based on a text book, supplemented by carefully directed map work and assigned readings. This should be preceded by a year course of medieval and modern European history.

COMMERCIAL GEOGRAPHY (one-half or one year). As the history of commerce is concerned with the past, so commercial geography describes and seeks to explain the commerce of today. The work should cover the ways in which commerce depends on nature and on man, the development of means of transportation and communication, and a detailed study of the several commercial nations of the world with reference to resources, industries, transportation facilities and commerce. It should be based on a text book supplemented by map work and assigned readings.

ELEMENTARY ECONOMICS (one-half year). In the study of economics it is desirable to avoid two extremes, abstract theory on the one hand, and controversial questions such as the tariff, trusts, and trade unions on the other hand. Emphasis should be placed on historical and descriptive matter, especially relating to the economic development of England and the United States. Some good elementary text book should be mastered and a reasonable amount of collateral reading required.

BUSINESS LAW (one-half year). The object of this study is not to make "every man his own lawyer" but rather to enable him to keep out of legal complications. Text book supplemented by study of a few typical cases, and practice in drawing up ordinary legal papers such as bills, notes, checks, etc.

BUSINESS ARITHMETIC (one-half year). The object is first of all, absolute accuracy and secondly speed in ordinary business computations. The topics to be emphasized are, fundamental operations, common fractions having as denominator 2, 3, 4, 6 and 8, a few common weights and measures, percentage and its applications, and useful short methods, especially the use of interest and other calculation tables. The work should be based on a text book, supplemented by numerous live exercises from current sources.

ELEMENTARY BOOKKEEPING (one year). A text book should be employed with exercises so arranged that no two pupils will do exactly the same work, and no credit should be allowed unless the work is done neatly, accurately and at a satisfactory rate of speed. It is suggested that double periods be provided, and all work be done in class under the eye of the instructor. The set used should include the journal, cash book, sales book, ledger, check book, bank pass book and trial balance book.

ADVANCED BOOKKEEPING AND BUSINESS PRACTICE (one year). Thorough drill on standard business forms, such as bills, receipts, checks, notes, etc., also on the use and meaning of business symbols and abbreviations. The student should become acquainted with the bill book and invoice book, and loose leaf and voucher systems of bookkeeping. Each student should carry on a business of his own, first as an individual,

then as a partnership, and finally as a corporation. Credit on this course should mean that the student lacks only age and actual business experience to become a competent bookkeeper.

STENOGRAPHY AND TYPEWRITING (two years). This work is expected to occupy not less than two periods daily for two years. No credit should be given for either shorthand or typewriting if taken alone. Nothing but the touch method should be used in typewriting. The essentials are first, accuracy and speed in taking dictation, and transcribing notes; secondly, correct spelling, capitalization, punctuation and paragraphing. The minimum speed at the end of the first year should be 75 words per minute in dictation and 25 words per minute on the machine; and at the end of the second year, 100 words per minute in dictation and 35 words per minute in transcribing notes. Thorough training should also be given in care of the machine, in modern methods of manifolding and in filing papers.

SPELLING AND BUSINESS CORRESPONDENCE (one-half year). Preliminary review of five hundred common technical business words. Thorough training on business correspondence including (1) the proper form for business letters, (2) the proper choice of words and construction of sentences with reference to clearness and brevity, (3) capitalization, punctuation and paragraphing, (4) writing and answering telegrams and advertisements. The work should be based on a text book supplemented by letters relating to most prominent industries of the locality.

PHYSICS (one year). It is suggested that the year's work be confined to four of the seven subjects mentioned below.

- (1) Mechanics of solids, (2) liquids and gases, (3) sound, (4) heat, (5) light, (6) and (7) electricity and magnetism (to count as two subjects, but not to be divided).

CHEMISTRY (one year). The full year's work should include a study of both the non-metals and metals with laboratory experiments illustrating the common chemical laws and the commoner chemical reactions.

BOTANY (one or one-half year). Schools which give one-half year of botany should devote particular attention to plant relations, making the course largely ecologic in bearing. When a whole year is given to the subject, additional work upon plant structures should be offered, and together with fundamental conceptions of ecology, a general idea of morphology and taxonomy should be the aim of the course.

ZOOLOGY (one or one-half year). The course of zoology, whether a half year or a year course, should be a natural history rather than a modern morphological course. Collecting and classifying (as a means) should be encouraged as much as possible. Animals should be studied as living units, in their relation to one another and their environment. The general and special structural feature in relation to the habits, the food and manner of obtaining it, the enemies and means of protection against them, hibernation, migration, the differences in habits, form and structure between the old or mature animal and the young, the relation of parents to their offspring, etc.—in short, all about the life of the animal under consideration should be made out by direct observation of the animal in its natural home and in confinement.

The course, on the whole, should aim to foster and develop a love for nature, train the power of observation toward accuracy and give a healthful stimulation to the imagination. The pupil should be guarded against the habit of confounding the facts of observation with his interpretation and his judgments.

The animals for direct observation should be selected from as many branches of the animal kingdom as possible, and the changes during the year in the character of the fauna of the locality in general as well as of some particular region should be noted. In some localities the work will of necessity be largely restricted to land and air animals, but no locality in Minnesota is so poor in animal life that very profitable work cannot be laid out along the line indicated above.

It will be noticed that such a course of necessity includes so-called laboratory work. The amount and extent of the laboratory work will depend upon conditions, but even under the best conditions it is hardly advisable to go into detailed dissections and embryology. Continued, repeated, and close observation, aided now and then, by a

simple hand lens or a compound microscope, will reveal an abundance of material and opportunity for disciplining the mind.

ASTRONOMY (one-half year). An elementary course in general astronomy as presented in any good modern text-book.

GEOLOGY (one-half year). These subdivisions should receive special attention: physiographic geology, which treats of the building of the land and the evolution of its existing contours; geo-dynamics, the study of the forces, atmosphere, water, terrestrial heat, plants and animals modifying the earth; and a brief survey of historical geology.

PHYSIOGRAPHY (one-half year). The following topics should be emphasized: meteorology, the leading facts relating to the atmosphere and its phenomena, including some acquaintance with the work of the United States weather bureau; land sculpture, as it treats of the origin, development and decadence of land forms, and the influence of these processes on the physical environment of man.

MANUAL SUBJECTS: In view of the multiplication of manual training courses in the high schools, it seems well to define what the University expects in the line of manual training and drawing work. It is not implied that many schools, or perhaps any one school, should offer all of the subjects indicated. Not to exceed twenty-five per cent of the units for admission to the University should in any case be taken from the list given below. The major part of the course should consist of the required English, and of mathematics, history, science and foreign languages. Students taking a manual training course should be held to a full course in mathematics, and should be required to complete not less than two years of one foreign language.

Owing to the fact that drawing and shop work do not require outside preparation, it is not fair that they should be credited by the schools on the same basis as the academic subjects. It is therefore suggested that half credits be allowed; that is to say, one full credit for two years of work one period daily, or for one year of work two periods daily, in each subject.

FREEHAND DRAWING (two credits)

MECHANICAL DRAWING (two credits)

JOINERY (one-half credit)

WOOD TURNING AND CABINET MAKING (one-half credit)

PATTERN MAKING AND FORGE SHOP (one-half credit)

MACHINE SHOP, INCLUDING CHIPPING

FILING AND WORK ON THE IRON LATHE (one-half credit)

DRILL PRESS AND IRON PLANER

CLAY MODELLING (one-half credit)

WOOD CARVING (one-half credit)

DOMESTIC ART, INCLUDING CAREFULLY GRADED EXERCISES IN SEWING (one credit)

DOMESTIC SCIENCE, INCLUDING PRACTICAL COOKERY, AND HOUSEHOLD ECONOMY (one credit)

GRADUATION AND DEGREES

GRADUATION

The candidate for a degree must complete the requirements for graduation in his course. Any person may undergo, at suitable times, examination in any subject, and if such person pass in all the studies and exercises of the course, he is entitled to the appropriate degree; *provided*, however, that at least one full year (the one immediately preceding the granting of the degree) must be spent at the University, before such degree shall be granted, and *provided* that examination, in every case, be held before a committee of the faculty appointed for that purpose.

For detailed information concerning requirements see the bulletins of the separate colleges and schools.

DEGREES

The degrees Bachelor of Arts, Bachelor of Arts in Education, Bachelor of Science, Master of Science, Master of Arts, Doctor of Philosophy, Civil Engineer, Mechanical Engineer, Electrical Engineer, Engineer of Mines, Metallurgical Engineer, Bachelor of Science in Chemistry, Bachelor of Science in Chemical Engineering, Bachelor of Science in Agriculture, Bachelor of Science in Forestry, Bachelor of Science in Home Economics, Doctor of Civil Law, Master of Laws, Bachelor of Laws, Doctor of Medicine, Doctor of Dental Surgery, and Bachelor of Pharmacy, are conferred, after recommendation by the deans of the respective colleges, by vote of the Regents.

THE UNIVERSITY STATE TEACHER'S CERTIFICATE

Graduates of the University may apply for and receive upon vote of the faculty the University State Teacher's Certificate under the following conditions:

First: They must have maintained a good average of scholarship throughout the four years of college study.

Second: They must have the recommendation of at least one department concerned with high school studies.

Third: They must have completed one semester of Psychology and three semesters of Education, including courses 1 and 2.

This certificate by state law authorizes students to teach in the public schools of Minnesota for two years from date. After that time, upon satisfactory evidence of success, the certificate may be made permanent by the endorsement of the State Superintendent of Public Instruction and the President of the University.

VII

FEES AND EXPENSES

Expenses

FEES

COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

Per semester
Resident

Incidental fee*	\$10.00
Animal Biology, 1 to 6, each	3.00
Animal Biology, 7	1.00
Botany, 1, 2, 3, 5, 6, each	3.00
Chemistry 1 (a), 1 (b), 2, 3, each	5.00
Chemistry 4, 5, each	7.00
Chemistry, 6	10.00
Geology, 9 and 10, each	1.00
Mineralogy, 1, 2, 3, and 4, each	3.00
Music, 1, 2, 3, 6 7, each	4.00
Music, 4	\$25.50 to \$85.00
Music, 5	2.00
Physics 2, 4, 5, 6, 8, 10, 13, 15, each	3.00
Physics, 7, 11, and 16, each	5.00
Drill suit, \$15.00.	
Gymnasium suit, \$2.00	
Locker fees, \$1.50.	
Deposit fee—military department, \$5.00.	
*Incidental fee, non-resident, \$20.00.	

COLLEGE OF ENGINEERING

Incidental fee*	\$15.00
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FRESHMAN YEAR

First Semester

Shop work	\$ 4.50
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Second Semester

Shop work	\$ 4.50
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FOR CLASSES GRADUATING IN 1909-1910-1911

SOPHOMORE YEAR

First Semester

Shop work	\$ 7.00
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Physics	3.00
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Chemistry	3.00
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Second Semester

Shop work	7.00
Physics	3.00

JUNIOR YEAR

First Semester

Shop work	\$ 4.50
Materials Testing Laboratory	6.00
Electrical Laboratory	1.50
Physics	3.00

Second Semester

Shop work	\$ 4.50
Steam Laboratory	3.00
Hydraulic Laboratory	3.00
Fuel and Gas analysis	5.00
Electrical Laboratory	6.00

SENIOR YEAR

First Semester

Electrical Laboratory	\$3.00
Electric Power	3.00
Experimental Laboratory	6.00

Second Semester

Electrical Laboratory	\$ 4.50
Electric Power	3.00
Gas Engine Laboratory	4.50

Deposit fee—military department, freshman and sophomore years ...	\$ 5.00
Drill suit	15.00

*Incidental fee, non-resident, \$30.00.

COLLEGE OF AGRICULTURE

See statement for College of Science, Literature and the Arts

COLLEGE OF LAW

Matriculation fee	\$10.00
Incidental fee (three terms) per term	20.00

COLLEGE OF MEDICINE AND SURGERY

	Per semester
Incidental fee	\$50.00
Microscope fee, 1st year	4.00
2nd year, 1st sem., \$3.00, 2nd sem	4.00
2nd year, 1st semester	4.00

Caution fee (see p. 39, Bulletin of College of Medicine and Surgery)	Per year \$5.00
Hospital fee (Jr. and Sr. year)	3.00

COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

See College of Medicine and Surgery

COLLEGE OF DENTISTRY

Incidental fee	Per semester \$75.00
Breakage deposit (see p. 19, Bulletin of College of Dentistry)	Per year 5.00

COLLEGE OF PHARMACY

	Per year
TWO YEAR COURSE	
First year	\$75.00
Second year	90.00
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	\$165.00

THREE YEAR COURSE

First year	\$45.00
Second year	55.00
Third year	65.00
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	\$165.00

SCHOOL OF MINES

FRESHMAN YEAR

Incidental fee*	Resident \$30.00
Chemical laboratory fee	10.00
Mineralogical laboratory fee	6.00
Assaying laboratory fee	15.00
Books	13.00
Draughting instruments	15.00
Note book and supplies	6.00
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	\$95.00

SOPHOMORE YEAR

Incidental fee*	\$30.00
Chemical laboratory fee	14.00
Books	8.00
Note books and supplies	2.00
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	\$54.00

JUNIOR YEAR

Incidental fee*	\$30.00
Steam laboratory	2.00
Trip to the mines	\$100.00 to 175.00
Books	20.00
Note books and supplies	2.00
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	\$152 to \$227.00

SENIOR YEAR

Incidental fee*	\$30.00
Chemical laboratory fee	10.00
Electrical laboratory fee	5.00
Ore testing laboratory fee	10.00
Experimental laboratory fee	6.00
Books	30.00
Note books and supplies	2.00
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	\$93.00

Deposit fee	3.00
*Incidental fee, non-resident, \$60.00.	

THE SCHOOL OF CHEMISTRY

Incidental fee*	\$15.00
Shop	7.00
Assaying	15.00
Courses 1, 2, 3, 10, 14, 18, 19, 23	5.00
Courses 4, 5	7.00
Course 6	10.00
Courses 9, 11, 12, 13, 15, 16, 17, 20, 24	3.00
Incidental fee, non-resident, \$30.00.	

THE COLLEGE OF EDUCATION

See statement under College of Science, Literature, and the Arts.

THE GRADUATE SCHOOL

Incidental fee	\$10.00
Proportionate fees for less than full work.	
A fee of 25 cents per day is charged for each day of delayed registration in each of the colleges except the graduate school.	

EXPENSES

The expense of living at the University varies greatly according to individual habits and tastes. In general the scale of expense is below rather than above that of similar institutions in the middle west and is

considerably lower than that of most institutions situated in the eastern states.

Several years ago a number of young men and women, at the request of University officials, kept careful account of their expenses for the University year. The result was that the expenses of the young men ranged from two hundred and seventeen to three hundred and ninety-seven dollars for the University year. The same students earned sums varying from two hundred and thirty-seven to two hundred and seventy-two dollars. The young women reported expenses varying from one hundred and fifty to three hundred and fifty-five dollars. These figures do not include fees, and, as the cost of living has increased decidedly, probably twenty-five per cent should be added to these figures to make them safe.

The students upon whose statements these figures are based were representative students; they were not extravagant nor did they deny themselves unduly to get along. While students can live within the figures given above, they would not, owing to the increased cost of living, be able to live as comfortably nor to have as many privileges as these students had.

Meals can be had at prices ranging from two dollars and a quarter per week to as high as the student can afford to pay. In private families board ranges from three to five dollars.

Furnished rooms vary in price from eight to twenty dollars per month. Two students rooming together would of course reduce this expense. It is sometimes possible for a student, rooming alone, to secure a good room at an expense but little higher than when two room together; but such chances are the exception and not the rule. New students will find that they will be more likely to secure comfortable rooms and suitable board if they will consult the general secretary of either the Young Men's or Young Women's Christian Association immediately upon arrival at the University, or if they will correspond with these officers before coming to the University.

The student who learns some trade before coming to the University has a great advantage over the student who has to earn his money by ordinary manual labor. Students have earned their whole expenses while attending the University, and have made good records at the same time. Other students have done so much work that they have not been able to keep up their studies, and have thus missed the one thing for which they were attending the University.

If it is possible for the student to have a part of his expenses paid, he should not attempt to earn his way entirely by his own exertions. It is a comparatively easy thing for a young man to earn half his living while attending the University and yet do good work in his classes. Students who want work seldom fail to find it. In coming to the Univer-

sity, the student should bring enough money with him so that he can live comfortably for a few weeks until he can find something to do.

Students who desire advice and assistance in securing a position to help pay their expenses should confer with the Secretary of the Y. M. C. A. at the University.

A pamphlet has been published containing five papers (one by a young woman) relating actual experiences of students who have made their way through the University. Students who contemplate making their own way through college will find here stated some very interesting and encouraging facts. A copy will be sent free to any address upon application.

VIII

DEPARTMENTS OF INSTRUCTION

THE COLLEGE of SCIENCE,
LITERATURE and THE ARTS

FACULTY

CYRUS NORTHROP, LL. D., *President*

JOHN F. DOWNEY, M. A., C. E., *Dean, Professor of Mathematics*

WILLIAM W. FOLWELL, LL.D., *Emeritus Professor of Political Science*

JABEZ BROOKS, D.D., *Professor of Greek*

JOHN G. MOORE, B. A., *Professor of German*

CHRISTOPHER W. HALL, M. A., *Professor of Geology and Mineralogy*

JOHN CORRIN HUTCHINSON, B. A., *Professor of Greek Language and Literature*

JOHN SINCLAIR CLARK, B. A., *Professor of Latin Language and Literature*

MARIA L. SANFORD, *Professor of Rhetoric and Elocution*

CHARLES WILLIAM BENTON, Litt. D., *Professor of the French Language and Literature*

HENRY F. NACHTRIEB, B. S., *Professor of Animal Biology*

FREDERICK S. JONES, M. A., *Professor of Physics*

WILLIS MASON WEST, M. A., *Professor of History*

GEORGE BELL FRANKFORTER, Ph. D., *Professor of Chemistry*

FRANCIS P. LEAVENWORTH, M. A., *Professor of Astronomy*

FREDERICK KLAEBER, Ph. D., *Professor of Comparative and English Philology*

JOSEPH BROWN PIKE, M. A., *Professor of Latin*

CHARLES PETER SIGERFOOS, Ph. D., *Professor of Zoology*

JOHN ZELENY, Ph. D., *Professor of Physics*

SAMUEL G. SMITH, Ph. D., LL.D., *Professor of Sociology*

GEORGE FRANCIS JAMES, Ph. D., *Professor of Education*

NORMAN WILDE, Ph. D., *Professor of Philosophy and Psychology*

WILLIAM A. SCHAPER, Ph. D., *Professor of Political Science*

†FRANK MALOY ANDERSON, M.A., *Professor of History*

CHARLES FREDERICK SIDENER, B. S., *Professor of Chemistry*

CARL SCHLENKER, B. A., *Professor of German*

ALBERT WILLIAM RANKIN, B. A., *Professor of Education*

RICHARD BURTON, Ph. D., *Professor of English Literature*

†GEORGE NEANDER BAUER, Ph.D., *Professor of Mathematics*

FREDERIC EDWARD CLEMENTS, Ph. D., *Professor of Botany*

ALBERT ERNEST JENKS, Ph. D., *Professor of Anthropology*

FRANCES SQUIRE POTTER, M. A., *Professor of English*

ALBERT BEEBE WHITE, Ph. D., *Professor of History and Politics*
 JOHN HENRY GRAY, Ph. D., *Professor of Economics and Politics*
 EDWARD VAN DYKE ROBINSON, Ph. D., *Professor of Economics and Politics*
 GISLE BOTHNE, M. A., *Professor of Scandinavian Languages and Literature*
 ANDREW ADIN STOMBERG, M. A., *Professor of Scandinavian Languages and Literature*

CHARLES MARTIN ANDRIST, M. L., *Assistant Professor of French*
 JOSEPH W. BEACH, Ph. D., *Assistant Professor of English*
 JOHN C. BROWN, M. A., *Assistant Professor of Animal Biology*
 OSCAR BURKHARD, M. A., *Assistant Professor of German*
 WILLIAM HENRY BUSSEY, Ph. D., *Assistant Professor of Mathematics*
 ADA LOUISE COMSTOCK, M. A., *Assistant Professor of Rhetoric and Dean of Women*

LOUIS JOSEPH COOKE, M. D., *Director of Gymnasium*
 HANS H. DALAKER, M. A., *Assistant Professor of Mathematics*
 SAMUEL N. DEINARD, Ph. D., *Assistant Professor of Semitic Language and Literature*

HAL DOWNEY, M. A., *Assistant Professor of Animal Biology*
 †HENRY ANTON ERIKSON, B. E. E., *Assistant Professor of Physics*
 JULIUS T. FRELIN, B. A., *Assistant Professor of French*
 JOHN EVENSON GRANRUD, Ph. D., *Assistant Professor of Latin*
 HANS JUERGENSEN, M. A., *Assistant Professor of German*
 EDWARD M. LEHNERTS, B. S., *Assistant Professor of Geography*
 **EDWARD EUGENE McDERMOTT, M. S., *Assistant Professor of Rhetoric*
 JAMES BURT MINER, Ph. D., *Assistant Professor of Psychology*
 EDWARD E. NICHOLSON, M. A., *Assistant Professor of Chemistry*
 OSCAR W. OESTLUND, Ph. D., *Assistant Professor of Biology*
 MARY GRAY PECK, M. A., *Assistant Professor of English*
 SAMUEL N. REEP, M. A., *Assistant Professor of Sociology*
 CARL OTTO ROSENDAHL, Ph. D., *Assistant Professor of Botany*
 FREDERICK W. SARDESON, Ph. D., *Assistant Professor of Paleontology*
 CHARLES ALBERT SAVAGE, Ph. D., *Assistant Professor of Latin and Greek*
 CARLYLE SCOTT, *Assistant Professor of Music*
 DAVID FERDINAND SWENSON, B. S., *Assistant Professor of Philosophy*
 FLETCHER HARPER SWIFT, Ph. D., *Assistant Professor of Education*
 JOSEPHINE E. TILDEN, M. S., *Assistant Professor of Botany*
 *WILLIAM LINN WESTERMANN, Ph. D., *Assistant Professor of History*
 MATILDA JANE CAMPBELL WILKIN, M. L., *Assistant Professor of German*
 HENRY L. WILLIAMS, M. D., *Director of Athletics*

†On leave of absence during 1908-9.

*Resigned May 7, 1908.

**Died February 27, 1908.

ANTHONY ZELNY, Ph. D., *Assistant Professor of Physics*

EDWARD SIGERFOOS, Ph. D., Capt. U. S. A., *Professor of Military Science*

INSTRUCTORS

CEPHAS DANIEL ALLIN, M. A., LL. B., *Political Science*

EMMA BERTIN, *French*

ANNA M. BUTNER, *Physical Culture*

HENRIETTA CLOPATH, *Drawing*

LILLIAN COHEN, M. A., *Chemistry*

JOHN M. COULTER, M. A., *Economics*

OSCAR W. FIRKINS, M. A., *Rhetoric*

FRANCIS C. FRARY, M. S., *Chemistry*

HALDOR B. GISLASON, B. A., LL. B., *Rhetoric*

FRANK F. GROUT, B. S., *Geology and Mineralogy*

ROWLAND HAYNES, M. A., *Psychology*

CHARLES M. HOLT, B. A., *Education*

LEULAH J. JUDSON, M. A., *History*

ALOIS F. KOVARIK, M. A., *Physics*

JENNINGS C. LITZENBERG, B. S., M. D., *Gymnasium*

LINDA H. MALEY, B. L., *Rhetoric*

JAMES E. MANCHESTER, Sc. D., *Mathematics*

CARL M. MELOM, M. A., *Spanish and French*

CHARLES W. NICHOLS, M. A., *Rhetoric*

RAYMOND V. PHELAN, Ph. D., *Economics*

BERT A. ROSE, *Band*

THEOPHILUS SCHROEDEL, B. A., *German*

ROYAL R. SHUMWAY, B. A., *Mathematics*

NELLIE A. WHITNEY, B. A., *Rhetoric*

†CHARLES WILLIAMS, M. A., *German*

†On leave of absence during 1908-9.

FEES

All students in the college, who are residents of the state, are charged an incidental fee of ten dollars a semester. Non-residents are charged double the fee required of residents of the state, or twenty dollars a semester. No reduction is made for late entrance or for leaving before the end of the semester. Save in the case of the first registration, the incidental fee is increased twenty-five cents for each day's delay in registration, beginning with the day set for recitations to begin. In addition to this fee, students who take work in laboratories are charged a sum sufficient to cover the cost of material and breakage.

CLASS ROUTINE AND SCHOLASTIC REQUIREMENTS

Class work extends through six days of the week, except Saturday afternoon. The daily session is divided into eight class periods of fifty minutes each, four in the morning and four in the afternoon. The morning session begins at eight thirty and closes at twelve thirty-five; the afternoon session extends from two o'clock until five forty. A general assembly of the faculty and students is held at ten thirty A. M.

Most of the courses of instruction are given in three periods per week. One series is scheduled for Monday, Wednesday, and Friday, another series for Tuesday, Thursday, and Saturday. Students are advised to try to arrange their programs so as to secure as even a distribution as possible between the two series, and also if possible in such a manner that they may have a half of each day free for study at their rooms, some laboratory, or in the University library. This arrangement can usually be secured without restricting the choice of subjects by careful study of the program and bulletin.

Examinations are held at the close of each semester. Students are graded upon the basis of their class work and examinations for each subject which they pursue as excellent, good, passed, incomplete, conditioned, or failed. For graduation an average of good must be secured in at least fifty per cent of the courses pursued. In computing the averages an excellent balances a pass, making an average of good for each of the two courses. An incomplete must be removed within one month

after the opening of the following semester or it becomes a condition. A condition can be removed by passing an examination in the subject before the opening of the corresponding semester of the following year; if not so removed, it becomes a failure and is subject to the rules governing failures. A failure must be pursued again in class.

A student who at any time becomes deficient in more than the work of one half year loses his class rank and is regarded as a member of the next lower class. Students whose absences exceed four weeks in the aggregate during a semester are not permitted to take the semester examinations without special permission of the faculty. Any student receiving conditions or failures in sixty per cent of the work of the first semester is dropped from the rolls and not allowed to re-enter the University until the opening of the following year.

Admission

Every applicant for admission, except those belonging to classes four and five below, must take the entrance examination in English. For details see page 41. No student is admitted with more than three half-year conditions and all such conditions must be removed by examination within one year.

The regulations governing admission recognize seven different classes of applicants, according to the mode of their preparation or the line of work which they propose to pursue.

1. ADMISSION TO THE FRESHMAN CLASS BY CERTIFICATE

- A. Graduates of the following courses are admitted to the freshman class, provided they have completed four years of English and one year each of algebra and plane geometry, on the terms specified under B.
- (a) Any four-years course of a Minnesota state high school.
 - (b) Any four-years course of other accredited schools in Minnesota.
 - (c) Any four-years course of schools in any other state which are accredited to the state university of that state.
 - (d) The advanced Latin or English course of the Minnesota state normal schools.

For applicants under (a) or (b) however, this certificate privilege is limited by the proviso that each school so accredited shall keep its records of standings in the following grades: passed, passed with credit; and passed with honor; or else shall show by a printed statement in the record book and in the catalogue of the school, how the marks in use are to be translated into these three grades.

- B. The applicant for admission must present to the registrar the principal's certificate containing his record on all the studies which were counted towards graduation.

All records shall be entered on this certificate as "passed," "passed with credit" or "passed with honor".¹

¹In per cents, these three grades are to be interpreted approximately as follows:

- (1) In schools having 65 as a passing mark, passed=65-75, passed with credit=75-90, passed with honor=90-100.
- (2) In schools having 75 as a passing mark, passed=75-80, passed with credit=80-90, passed with honor=90-100.

Each mark below "passed with credit" shall count as a condition, unless a state high school board certificate shall be presented for the same subject.

Beginning in September, 1909, this rule for admission shall be applied to all work completed after June, 1908. Until it goes into effect for the full four years work, applicants will be admitted provided they have not, on the average, more than one semester mark below "passed with credit" for each year subject to the rule.

2. ADMISSION TO THE FRESHMAN CLASS BY EXAMINATION

Entrance examinations are offered at the University during the opening week of the University year. The program for the year 1908-9 is printed in this bulletin on page 4. Certificates of Minnesota state high school board examinations will be accepted in place of University entrance examinations in whole or in part.

Students who enter by examination, besides the entrance examination in English, must pass examinations in secondary school subjects as follows:

- (1) The six year-credits under "A" below and
- (2) Nine year-credits selected from the list of electives under "B," provided that, if the total of entrance conditions does not exceed three half-year credits, the applicant shall be admitted conditionally and be given one year in which to make up the entrance conditions.

A. SUBJECTS REQUIRED OF ALL

English, four years, including

- (a) Classics
- (b) Principles of composition
- (c) Practice in written expression

Mathematics

- (a) Elementary algebra, one year
- (b) Plane geometry, one year

B. ELECTIVES, NINE YEAR-CREDITS REQUIRED

Mathematics

Higher algebra, one-half year
Solid geometry, one-half year

Latin

Grammar, one year
Caesar, four books, one year

Cicero, six orations, one year

Virgil, six books, one year

Greek

Grammar, one year

Anabasis, four books, one year

German

Grammar, one year

Literature, one year

French

Grammar, one year

Literature, one year

Spanish

Grammar, one year

Literature, one year

Swedish, Danish-Norwegian, Icelandic

Grammar, one year

Literature, one year

History

Ancient to Charlemagne, one year

Modern from Charlemagne, one year

England, one-half year

Senior American, one-half year

American Government, one-half year

Business Subjects

History of commerce, one-half year

Commercial geography, one-half year or one year

Elementary economics, one-half year

Business law, one-half year

Business arithmetic, one-half year

Elementary bookkeeping, one-half year

Advanced bookkeeping and business practice, one year

Stenography and typewriting, two years

Business spelling and correspondence, one-half year

Physics, one year

Chemistry, one year

Botany, one-half or one year

Zoology, one half or one year

Astronomy, one-half year

Geology, one-half year

Physiography, one-half year

Freehand drawing, two credits¹
Mechanical drawing, two credits¹
Shop work, two credits¹
Modeling and wood carving one credit¹
Domestic art and science, two credits¹

3. ADMISSION TO THE SIX YEARS MEDICAL COURSE

For a full statement of all matters connected with the six year medical course see pages 117-121.

4. ADMISSION TO THE SOPHOMORE CLASS FROM MINNESOTA STATE NORMAL SCHOOLS.

Graduates of the advanced graduate course of a Minnesota state normal school are admitted with advanced standing equivalent to one year's credit, and receive the degree of bachelor of arts upon completing in this college ninety-six credits including freshman mathematics, courses three and four, provided the usual requirements regarding majors and minors on pages 44-45 be complied with. Such students will not be permitted to elect education five or seven, mathematics one or two, rhetoric one, or history one, and upon registering for mathematics three and four will be required to make good any deficiency in preparatory mathematics.

Individual graduates of the advanced Latin course (five years) or of the advanced English course (five years) of the Minnesota state normal school, who, on the basis of maturity and ability, present certificates of special fitness from the president of the normal school, will be admitted with advanced standing under the same regulations and proviso.

5. ADMISSION TO ADVANCED STANDING

This college accepts records from all reputable colleges and universities for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in this college. In bringing records from other institutions, the certificate must be upon the official blank of the institution granting the certificate, and should show:

- (a) The subject studied; if a language, the books read, etc.
- (b) The time spent upon each subject.
- (c) Ground covered in laboratory work in case of laboratory sub:

6. ADMISSION AS UNCLASSED STUDENTS

Whenever in the judgment of the enrollment committee an applicant presents satisfactory reasons for not taking the regular course, such a applicant may be admitted as an unclassified student. He must take the same examinations or present the same credentials as are required of those who enter the freshman class. (See classes one and two.) Exceptions can be made only upon vote of the faculty. A new application must be made each semester to the enrollment committee.

7. ADMISSION TO STUDY MUSIC

Students who enter the University for the express purpose of studying music, must take the same examinations or present the same credentials that are required by those who apply for admission to the freshman class. (See classes one and two). No student is admitted for the purpose of studying music, unless he presents a certificate from the department of music showing that he is qualified to pursue the courses offered.

ENTRANCE EXAMINATION IN ENGLISH

All applicants for admission to the College of Science, Literature and the Arts, except those belonging to classes four and five above, must be examined in writing, spelling, and English composition. The examination will be given in two parts.

Part I. Elementary.—Those who fail to pass this examination satisfactorily are required to take a special three-hour preparatory course in composition through their first year or longer if necessary. This work is not credited toward a degree. Students pursuing it are not allowed to take more than maximum of seventeen hours of work per week including this course. These students must take rhetoric one, but not until the preparatory work has been completed. At any time during the first half of the first semester the department of rhetoric may transfer promising students from the preparatory class to the class in rhetoric one.

Part II. Advanced.

Those who pass both parts of the examination with a grade of good or excellent take English one and two during their freshman year. Those who do not obtain one of these required grades register for rhetoric one.

The entrance examination will be given at the University in the chapel of the library building, Saturday May 16, and Wednesday, September 9, at 9:00 a. m.

The examination in May will be sent, upon application, to the principals of state high and other accredited schools in the state to be offered in each school at the option of the principal, to members of the senior class who expect to enter the University. The examination, if given, must be held on Saturday, May 16, under the general rules which govern state high school board examinations. All papers must be sent immediately after examination to the Registrar of the University and will be marked by the proper University authority.

Students who enter the freshman class after the regular September examination without having taken the test in English may be given a special test if the department of rhetoric sees fit, or shall be registered for preparatory rhetoric with the provision that, if found proficient during the first six weeks, they may be promoted to the freshman rhetoric class. Such students must be prepared to suffer any further change in registration necessitated by the program and rules of the college.

Courses of Study

Students pursuing work in the College of Science, Literature, and the Arts are classified as follows: (1) those pursuing the four years course in science, literature, and the arts leading to the degree bachelor of arts; (2) those pursuing the six years medical course in science and medicine; (3) music students; (4) unclassified students. The regulations regarding the course of study prescribed for each category of students are outlined below:

1. FOUR YEARS COURSE IN SCIENCE, LITERATURE AND THE ARTS LEADING TO THE DEGREE OF BACHELOR OF ARTS

The degree of bachelor of arts will be conferred upon any student who fulfills the conditions as to amount, grade and distribution of work stated under A, B, and C below:

A. AMOUNT OF WORK.—The student must earn from the courses offered in the college one hundred and twenty-six credits in addition to the required exercises in drill, gymnasium, and physical culture.

A credit is one hour per week through one semester.

Juniors and seniors pursuing beginning language courses (not including Spanish, Greek, and Hebrew), English one and two, mathematics one and two, chemistry one (a), rhetoric one, or history one, shall receive only half credits.

No student shall receive credit for more than two beginning modern language courses, save by special permission.

A double period in laboratory subjects counts as one credit hour.

B. GRADE.—In at least one-half his work (sixty-three credits), the student must secure a grade of "good." For the system of grades see page 25. For the purpose of this count each "excellent" shall balance one "pass," making an average of "good" for both records.¹

C. DISTRIBUTION OF WORK.—

1. The student must complete a major and four minors. A major is not less than eighteen credits, and a minor is not less than twelve credits in one department. Two minors, or a major and a minor, may be combined in one department, but at least one of the five subjects shall be chosen from each of the following groups:

(a) English, French, German, Greek, Latin, rhetoric

(b) Animal biology, astronomy, botany, chemistry, geology and mineralogy, physics

(c) Economics and political science, history, mathematics, philosophy, sociology and anthropology.

In the statement of courses, departments may indicate any courses which shall not count toward a major or minor, and in no case shall the following courses be so counted: the first year of be-

¹This rule applies for graduates of 1908-9 only to work in the junior and senior years, and for graduates of the year 1909-10 to work of the sophomore, junior, and senior years.

ginning languages (excepting Spanish, Greek, and Hebrew), English one and two, mathematics one and two, general chemistry one (a), rhetoric one, and history one.

2. Each student must choose his major subject before the end of the sophomore year.
3. Upon the choice of his major subject, the department in which the student has made his selection shall assign him to an adviser in that department.
4. The student shall choose, under the advice and approval of his adviser, a sufficient amount of work to make with his major, a total of forty-eight credits, the additional subjects being such as to reinforce the major.

The distribution of the work by years is in accordance with the following plan:

FRESHMAN YEAR

Required

For men, military drill, three hours, and gymnasium, one hour in two periods; for women, physical culture, three hours.

English one, three hours, for those who have passed part two of the entrance examination in English with a grade of good or excellent, or rhetoric one, three hours, for those who have not obtained one of these grades upon the entrance examination in English.

Mathematics one and two, five hours, for those who do not present entrance credits in higher algebra, part one, and solid geometry.

Elective by Groups

The amount of work must be not less than fifteen hours nor more than seventeen exclusive of that mentioned in the first paragraph above. The subjects chosen must be continued through the year.

Those who have credits in both First Part Higher Algebra and Solid Geometry must select one subject from each of the following groups and one additional subject from any one of the groups.

Those who have not credits in both First Part Higher Algebra and Solid Geometry must select from the following groups three subjects if the language chosen is three times per week, and two subjects if the language chosen is five times per week. When two subjects are elected, they must be in different groups; but when three are elected, two may be from one group.

GROUP ONE

French one, five hours; or French three, three hours, with or without French four (conversation), two hours.

German one, five hours; or German four, three hours, with or without German five (conversation), two hours.

Latin one, three hours.

Scandinavian one, five hours, or three, three hours; or Scandinavian two, five hours, or four, three hours.

GROUP TWO.

Animal biology one, three hours.

Botany one, three hours.

Chemistry one or two, three hours.

GROUP THREE.

Greek one, five hours; or Greek three, three hours.

History one or two, three hours.

Mathematics three and four, three hours.

SOPHOMORE YEAR

Military Drill, two hours -Required of men.

In addition to military drill, sophomores shall elect not less than fifteen nor more than eighteen credit-hours of work from the subjects open to them. See departmental statements.

JUNIOR AND SENIOR YEARS

The work of these two years is entirely elective, it being provided that no student shall elect less than fifteen nor more than eighteen hours of work in any semester, save by permission of the committee on students' work.

1. Students who carry military drill beyond the required two years will be allowed two semester credits for each year; but no credit will be allowed for such drill for less than one year.

2. Seniors contemplating entering the medical department are permitted to elect the courses in anatomy, chemistry, histology and physiology (it being understood that no repetition of work is allowed) in the medical department. The work completed in any or all of these subjects will be applied toward the work required for a degree in this department.

3. Members of the senior class of this college are permitted to elect throughout the senior year, work in the College of Law, including the elements of contracts, domestic relations, torts, and criminal law. The satisfactory completion of the above named courses will give the student twelve senior credits, and will entitle him to admission to the middle class of the College of Law. The student may also elect the subject of negotiable paper and receive credit in the College of Law, but such election shall not be a basis for a claim for additional credits in the College of Science, Literature, and the Arts. No student will be permitted to take more than one lecture each day in the College of Law, without special permission of the faculty of this college. The work must be taken with the night class in the College of Law.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS WITH DISTINCTION

Students may receive the degree of bachelor of arts with distinction in accordance with the following plan:

1. The degree with distinction shall be granted upon the basis of special excellence in the major subject.

2. To become a candidate for the degree of A. B. with distinction, the student must signify his intention by registration, upon the proper blank, at some time between the close of the freshman year and the beginning of the senior year. Students wishing to become candidates for the degree are advised to register as such as early in the course as possible.

3. At the time of registration for such degree the applicant must have an average of *good* in all his previous work. (For the purpose of this count, each excellent shall balance one *pass*, making an average of *good* for both records).

4. To receive the degree with distinction at graduation, the student must fulfill the following requirements:

- a. Comply with all the regulations applying to the ordinary degree of bachelor of arts.
- b. Secure a record at graduation, higher than pass in four-fifths of all his work (provided that an excellent shall balance a pass as in B. page 44.)
- c. By May 1st of his senior year, present a satisfactory thesis upon a subject approved by the adviser in charge of this work.
- d. Comply with the special requirements of the department in which he takes his major work.
- e. Be recommended by the department to the faculty for *special excellence* in his work; and
- f. Be approved by vote of the faculty.

5. A student registered for the degree with distinction may withdraw his name at any time from such registration, or the registration may be cancelled by the department concerned, or by the dean after consultation with the department; but students whose registration for the degree with distinction has been withdrawn or cancelled shall still receive the degree of bachelor of arts upon completion of the requirements therefor.

6. The degree shall be given in the diploma thus: Bachelor of Arts, with distinction.

7. The names of students recommended by the faculty for the degree with distinction shall appear in the commencement program, with the statement that distinction has been acquired in a certain department. A certificate signed by the head of the department and the registrar shall be presented to the student who has attained the degree with distinction.

8. The special requirements of the departments in which distinction may be gained shall be authorized by the faculty, after recommendation by the curriculum committee.

2. SIX-YEARS COURSE IN SCIENCE AND MEDICINE LEADING TO THE DEGREE OF BACHELOR OF SCIENCE AND DOCTOR OF MEDICINE

For all matters connected with this course see pages 117-121.

3. COURSE FOR MUSIC STUDENTS

Students who have entered the University for the express purpose of studying music are required to register for courses one and four in music and at least six credits in other courses outside the department of music, preferably modern languages, to be selected with the approval of the enrollment committee.

4. UNCLASSED STUDENTS

Unclassed students must take the same number of hours as regular students, and, unless advanced standing is obtained through credits from other institutions, four-fifths of the work during the first year must be taken from subjects offered to freshmen. A new application must be made each semester to the enrollment committee.

Any unclassified student who has satisfied the regular entrance requirements may classify at the beginning of either semester as a regular student, and become a candidate for the bachelor of arts degree by registering in accordance with the regulations governing amount and distribution of work as indicated on pages 44-46.

Departmental Statements

ORDER OF DEPARTMENTAL STATEMENTS

- I. English Language and Literature
(a) English, (b) Comparative Philology, (c) Rhetoric
- II. Ancient Languages and Literatures
(a) Greek, (b) Latin, (c) Semitic Languages
- III. Modern Languages and Literatures
(a) German, (b) Romance Languages, (1) French, (2) Spanish,
(3) Italian, (c) Scandinavian Languages
- IV. Biological Sciences
(a) Animal Biology, (b) Botany, (c) Paleontology
- V. Physical Sciences
(a) Chemistry, (b) Geology and Mineralogy, (c) Physics
- VI. Pure and Applied Mathematics
(a) Mathematics, (b) Astronomy, (c) Mechanics, (d) Physics
- VII. Philosophy, Education, and Anthropology
(a) Philosophy and Psychology, (b) Education, (c) Anthropology
- VIII. Social Sciences
(a) Economics and Political Science, (b) History, (c) Sociology
- IX. Fine Arts
(a) Drawing, (b) Music
- X. Military Science and Physical Culture

I. English Language and Literature

ENGLISH

The requirements for a major in English are the completion of courses 6, 7, 14, 15, 22, and twelve additional credits from other courses offered by the department. For a minor the requirements are the completion of one of the following courses: 1, 18, 19 and 22, and twelve additional credits from courses offered by the department. For distinction in English the special requirements of the department are the completion of a major in English and twelve additional credits from courses offered by the department, of which six shall be in Old English, and rhetoric 6. To obtain the recommendation of the department for a teacher's certificate courses 3 (first semester), 6, 7, 14, 15, 18 and 22, six additional credits from courses offered by the department, and rhetoric 6 must be completed.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Outline Eng. Lit.	1	3††	All	None
2.	Outline Am. Lit.	2	3††	All	See statement
3.	Early Eng.	1, 2	6	Soph., Jr., Sr.	None
4.	Middle Eng.	1	2	Soph., Jr., Sr.	See statement
6.	Chaucer	1	3	Soph.	None
7.	Spenser	2	3	Soph.	None
8.	Outline 18 Cent. Lit.	1	3	Soph., Jr.	Six credits
9.	Outline 19 Cent. Lit.	2	3	Soph., Jr.	Six credits
12.	Eng. Novel	1	3	Jr., Sr.	Six credits
13.	Bible as Lit.	2	3	Jr., Sr.	None
14.	Milton	1	3	Jr.	Courses 6 and 7, or six credits
15.	Shakespeare	2	3	Jr.	Courses 6, 7 and 14, or nine credits
16.	Mod. Drama	1, 2	6	Sr.	Course 15 or nine credits
18.	Teachers' Course	1, 2	2*	Sr.	Courses 6, 7, 14 and 15.
19.	Hist. Lit. Crit.	1, 2	2*	Jr., Sr.	None
20.	Eng. Prose	1	3	Jr., Sr.	Six credits
21.	Browning-Tennyson	2	3	Jr., Sr.	Six credits
22.	Hist. Eng. Lang.	2	1	Soph., Jr., Sr.	Course 3 (1st. sem.)
23.	Sen. Seminar	1, 2	1	Sr.	See statement
24.	Anglo-Saxon	1	..	Grad.	Major in Eng.
25.	Beowulf	2	..	Grad.	Major in Eng.
26.	Criticism ....	..	..	Grad.	See statement
27.	Shakespeare	1, 2	..	Grad.	Major in Eng.
28.	Prose Fiction	1, 2	..	Grad.	Major in Eng.
29.	Drama	1, 2	..	Grad.	Major in Eng.

†Sophomores, juniors, and seniors are allowed only half credit, not credited toward a minor.
†Courses 1 and 2 must be completed before credit is allowed for either.
*Both semesters must be completed before credit is allowed for the first semester.

1. OUTLINE OF ENGLISH LITERATURE

PROFESSOR BURTON, ASSISTANT PROFESSORS PECK AND BEACH

Three credits (three hours per week) First semester

Open to all, but sophomores, juniors, and seniors are allowed only half credit; freshmen must also complete course 2 before credits will be allowed for this course; not credited toward a major in English.

An outline sketch of the main personalities of English literature from the earliest times to the present. The intention is to enable the student later to approach more specific aspects of the study with a general notion of the subject.
2. OUTLINE OF AMERICAN LITERATURE

PROFESSOR BURTON, ASSISTANT PROFESSORS PECK AND BEACH

Three credits (three hours per week) Second semester

Open to freshmen who have completed course 1, and, at half credit, to sophomores, juniors and seniors; not credited towards a major in English.

A study of the salient figures of our native literary development. Special attention is given to contemporary writers.
3. EARLY ENGLISH

PROFESSOR KLAEBER, ASSISTANT PROFESSOR BEACH

Six credits (three hours per week) Both semesters

Open to sophomores, juniors and seniors; required of all who take

4. INTRODUCTION TO MIDDLE ENGLISH LANGUAGE AND LITERATURE

PROFESSOR KLAEBER

Two credits (two hours per week)

First semester

Open to sophomores, juniors, and seniors, who have taken the first semester of course 3; alternates with course 5.

An outline of middle English grammar including the interpretation of selected texts.

5. PIERS THE PLOWMAN

PROFESSOR KLAEBER

Two credits (two hours per week)

First semester

Open to sophomores, juniors and seniors, who have taken the first semester of course 3; alternates with course 4; not given in 1908-9.

A critical study of *Piers the Plowman*.

6. CHAUCER

ASSISTANT PROFESSORS PECK AND BEACH, AND MR. FIRKINS

Three credits (three hours per week)

First semester

Open to sophomores.

A study of the grammar and literary forms of fourteenth century English with selected readings from Chaucer's works. Special attention is given to the *Canterbury Tales*.

7. SPENSER

ASSISTANT PROFESSORS PECK AND BEACH, AND MR. FIRKINS

Three credits (three hours per week)

Second semester

Open to sophomores.

A course in the forms and literary influences in the Elizabethan period which are illustrated in the poetry of Edmund Spenser, with selected readings from the minor poems and three books entire of the *Faery Queen*.

8. OUTLINE OF EIGHTEENTH CENTURY LITERATURE

ASSISTANT PROFESSOR BEACH

Three credits (three hours per week)

First semester

Open to sophomores and juniors who have completed one year of work in English.

An outline study of the main personalities and literary forms of the eighteenth century. Particular attention to Defoe, Addison and Steele, Swift, Pope, Gray, and Johnson, with a sketch of the minor poets and novelists. Reports required on the reading of representative works.

9. OUTLINE OF NINETEENTH CENTURY LITERATURE

ASSISTANT PROFESSOR BEACH

Three credits (three hours per week)

Second semester

Open to sophomores and juniors who have completed one year of work in English.

An outline study of the main literary forms in the nineteenth century, with some consideration of all the major writers in poetry, the novel and the essay. Reports required on the reading of representative works.

12. THE ENGLISH NOVEL.

PROFESSOR POTTER

Three credits (three hours per week)

First semester

Open to juniors and seniors who have completed one year of work in English.

A study of the history and development of the English novel.

13. THE BIBLE AS LITERATURE

PROFESSOR POTTER

Three credits (three hours per week)

Second semester

Open to juniors and seniors.

A literary study of the Old Testament with special attention to forms and the critical study of selected readings.

14. MILTON

PROFESSOR POTTER

Three credits (three hours per week)

First semester

Open to juniors who have completed courses 6 and 7, or one year of work in English; courses 6 and 7 are the most suitable preparation; required of all who take their major or obtain a teacher's certificate in English.

A critical study of the early poems, six books of *Paradise Lost* and *Samson Agonistes*.

15. **SHAKESPERE** PROFESSOR POTTER
 Three credits (three hours per week) Second semester
 Open to juniors who have taken course 6, course 7, course 14 or a year and a half of English; courses 6, 7 and 14 are the most suitable preparation. Required of all who take their major or obtain a teacher's certificate in English.

An outline study of the Shakespeare plays, with a critical study of selected comedies, tragedies, and historical plays.

16. **CONSTRUCTION AND DEVELOPMENT OF THE MODERN DRAMA** ASSISTANT PROFESSOR PECK
 Six credits (three hours per week) Both semesters
 Open to seniors who have completed two years of work in English, which must include course 15.

First semester: a study of the theory of the drama, with the history of English drama to the middle of the nineteenth century. Second semester: a study of the inter-relation of the English with the continental drama in the late nineteenth century with special emphasis upon Ibsen.

18. **TEACHERS' COURSE IN ENGLISH** PROFESSOR POTTER
 Two credits (one hour per week) Both semesters
 Open to seniors who have completed courses 6, 7, 14, and 15; both semesters must be completed before credit is allowed for the first semester.

A survey of English literature with emphasis on methods of interpretation and teaching in the secondary schools.

19. **HISTORY OF LITERARY CRITICISM** PROFESSOR BURTON
 Two credits (one hour per week) Both semesters
 Open to juniors and seniors; both semesters must be completed before credit is given for the first semester.

This course traces the rise, growth and present condition of the principles of criticism as applied to literature.

20. **ENGLISH PROSE** PROFESSOR BURTON
 Three credits (three hours per week) First semester
 Open to juniors and seniors who have completed one year of work in English.

A discussion of current idiom with the purpose of relating it to the underlying principles of historical development.

21. **BROWNING AND TENNYSON** PROFESSOR BURTON
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed one year of work in English.

This course involves a reading of the representative work of the two major poets of the Victorian era, in order to show their quality and contrasted power.

22. **HISTORY OF THE ENGLISH LANGUAGE** PROFESSOR KLAEBER
 One credit (one hour per week) Second semester
 Open to sophomores, juniors, and seniors who have completed the first semester of course 3; required of all who take their major or obtain a teacher's recommendation in English.

23. **SENIOR SEMINAR IN ENGLISH** ASSISTANT PROFESSOR PECK
 Two credits (one hour per week) Both semesters
 Open to seniors who have taken courses 3 and 4 or any of the following courses: 6, 19, 20, 22.

Hakluyt's Voyages will be studied in 1908-9. The work will consist of an inquiry into the vivid and dramatic sources of the language and literature found in this "prose epic" of the Elizabethan seamen.

25. BEOWULF

PROFESSOR KLAEBER
Second semester

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.
26. PRINCIPLES OF CRITICISM

MR. FIRKINS

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

This course comprises a brief treatment of the elements or forces in literature, e. g., clearness, vigor, beauty, precision, art, taste, humor, truth, ethics, and the like; an exposition of literary types, e. g., lyric, epic, drama, short story, novel, biography, etc., in relation to the standards and methods of judging each.
27. SHAKESPERE

PROFESSOR POTTER

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.
28. THE DRAMA AS A LITERARY FORM

PROFESSOR BURTON
Both semesters

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.
29. THE DRAMA AS A LITERARY FORM

PROFESSOR BURTON
Both semesters

Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

COMPARATIVE PHILOLOGY

This department, besides offering courses in the general principles of linguistic science, affords an opportunity for elementary studies in comparative Indo-European philology, and more particularly the investigation of Old Germanic dialects. Related courses in English philology will be found under English language and literature.

The requirements for a major in comparative philology are the completion of courses 1, 3, 4, 5, and 6; for a minor, twelve credits. For distinction in comparative philology the special requirements of the department are to take all the undergraduate courses offered in two consecutive years, four of the graduate courses (of two hours each) given in two consecutive years, either English 3, 4 and 22, or English 3 and German 14.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Sc. of Lang.	1	2	Soph., Jr., Sr.	None
3.	Life of Words	1	2	Soph., Jr., Sr.	None
4.	Esperanto	2	1	Soph., Jr., Sr.	None
6.	Comp. Phonology	2	3	Soph., Jr., Sr.	See statement
7.	Comp. Grammar ....	..	..	Grad.	
8.	Gothic ....	..	..	Grad.	
9.	Urgerm. Gram. ....	..	..	Grad.	
10.	Old Saxon ....	..	..	Grad.	
11.	Old High German ....	..	..	Grad.	
1.	GENERAL INTRODUCTION TO THE SCIENCE OF LANGUAGE			PROFESSOR KLAEBER	
	Two credits (two hours per week)			First semester	
	Open to sophomores, juniors, and seniors.				
	This course will be sufficiently general in its nature to be of use to all students who wish to obtain an insight into the life of language.				
2.	HISTORY OF THE ALPHABET			PROFESSOR KLAEBER	
	Two credits (two hours per week)			First semester	
	Open to sophomores, juniors, and seniors, who have had four years of preparatory Latin; alternates with course 3.				
	Survey of the principal systems of writing. Development of the letters in the Indo-European languages. History of English spelling and spelling reform.				

3. **THE LIFE OF WORDS** PROFESSOR KLAEBER
Two credits (two hours per week) First semester
Open to sophomores, juniors, and seniors; alternates with course 2.
Etymology and semasiology. Growth of vocabulary; change of words in form and meaning. Lectures and exercises with special reference to English and other Germanic languages.
4. **ESPERANTO AND THE IDEA OF AN INTERNATIONAL LANGUAGE** PROFESSOR KLAEBER
One credit (one hour per week) Second semester
Open to sophomores, juniors, and seniors.
Comparison of the principal families of languages in grammatical and lexical respects. History of the movement for the creation of an international language. Consideration of the merits of Volapuk, Esperanto, and other artificial languages. Exercises in Esperanto.
5. **INTRODUCTION TO TEUTONIC PHILOLOGY** PROFESSOR KLAEBER
One credit (one hour per week) Second semester
Open to sophomores, juniors, and seniors, who have a fair knowledge of German; alternates with course 4.
History of Germanic philology, biographies of leading scholars (J. Grimm and others). Classification of the Germanic languages. Rapid survey of the various branches of the Teutonic group (Gothic, Norse, English, Frisian, Dutch, Low German, High German).
6. **COMPARATIVE PHONOLOGY OF ENGLISH AND GERMAN** PROFESSOR KLAEBER
Three credits (three hours per week) Second semester
Open to sophomores, juniors, and seniors who have a fair knowledge of German.
Elements of phonetics; history of English and German sounds; orthography. The lectures will be supplemented by practical exercises.
7. **COMPARATIVE GRAMMAR OF THE GREEK, LATIN, AND GERMANIC LANGUAGES** PROFESSOR KLAEBER
Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
A general survey of the field of Indo-Germanic philology will be included.
8. **GOTHIC** PROFESSOR KLAEBER
Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
The relation of Gothic to other Germanic dialects will be particularly emphasized. Study of the grammar (Braune, J. Wright, Streitberg) and reading of the gospels (Heyne's *Ulfilas*, 10th edition).
9. **URGERMANISCHE GRAMMATIK** PROFESSOR KLAEBER
Open to graduate students who have completed course 8; other arrangements may be ascertained upon application to the department.
Lectures and study of standard works (Brugmann, Kluge, Noreen, Streitberg, et al.).
10. **OLD SAXON** PROFESSOR KLAEBER
Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
Old Saxon Grammar and interpretation of the *Heliand*.
11. **OLD HIGH GERMAN** PROFESSOR KLAEBER
Open to graduates who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
Braune's *Althochdeutsche Grammatik*; Braune's *Althochdeutsches Lesebuch*.
This course is identical with German 14.

RHETORIC AND ELOCUTION

The requirement for a major in rhetoric is the completion of courses 1, 2, 3, and 6; for a minor, twelve credits. For distinction in rhetoric the

special requirements of the department are the completion of courses 1 to 4 inclusive, 6, and three credits for individual work with some professor in the department. Students who desire to obtain distinction in rhetoric are advised to take English 19 and 22. To obtain the recommendation of the department for a teacher's certificate courses 1, 2, 3 and 6, and eighteen credits in English must be completed.

HONORS IN PUBLIC SPEAKING

Students who have been on the debating teams in their freshman and sophomore years, or have won places in the oratorical contests of those years, and have taken part in intersociety and intercollegiate debates, winning at least one intercollegiate contest, or have won places on the Pillsbury oratorical contest, may, if the department deems them worthy, receive honors in public speaking.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1 (a)	Rhetoric	1, 2	6†	All	None
1 (b)	Argumentation	1, 2	6	Fresh., Soph.	See statement
2 (a)	Rhetoric	1, 2	6	All	See statement
2 (b)	Argumentation	1, 2	6	Soph., Jr., Sr.	Course 1
3.	Lit. Crit.	1	3	Jr., Sr.	Course 1
4.	Art. Lec.	2	3	Jr., Sr.	Course 1
6.	Advanced Rhet.	1, 2	6	Jr., Sr.	Courses 1 and 2
7.	Advanced Rhet.	1, 2	6	Jr., Sr.	Course 6
8.	Reading	1, 2	4*	Soph.	None

*Both semesters must be completed before credit is given for the first semester.

†Juniors and seniors receive only half credit.

RHETORIC

1 (a) RHETORIC MESSRS. FIRKINS AND NICHOLS, AND MISSES MALEY, GRIFFITH AND WHITNEY

Six credits (three hours per week) Both semesters

Open to all classes, but juniors and seniors must obtain the consent of the department and receive only half credit.

This course includes the study of formal rhetoric, the writing of compositions, and the study and analysis of masterpieces of prose.

1 (b) ARGUMENTATION MR. GISLASON
Six credits (three hours per week) Both semesters

Open to freshmen and sophomores recommended by the department; students who have had special preparation in debate may, by consent of the head of the department, substitute argumentation for rhetoric.

This course aims at instruction in the science of argumentation and in the art of debate. The work consists of study of the laws and processes of reasoning and their application to written and spoken argument. Speeches of eminent lawyers made before courts in the trial of famous cases are briefed and analyzed. Practical exercises in debate on the floor form an important part of the work.

2 (a) RHETORIC MR. FIRKINS, MISSES MALEY AND WHITNEY
Six credits (three hours per week) Both semesters

Open to freshmen who have obtained a grade of excellent upon the entrance examination in English, and to sophomores, juniors, and seniors, who have completed course 1.

The course consists of a study of the short story in the first semester, and of the essay and forms of public address in the second semester. The writing of compositions and the keeping of a note book form the greater part of the work.

2 (b) ARGUMENTATION MR. GISLASON
Six credits (three hours per week) Both semesters

Open to sophomores, juniors, and seniors, who have taken course 1 and have had some previous experience in debate.

3. LITERARY CRITICISM

PROFESSOR SANFORD

Three credits (three hours per week)

First semester

Open to sophomores (by special permission), juniors, and seniors, who have taken course 1.

A study of models of English poetry, oratory, fiction, etc., with critical essays.

4. ART LECTURES

PROFESSOR SANFORD

Three credits (three hours per week)

Second semester

Open to sophomores (by special permission), juniors, and seniors, who have taken course 1.

This course embraces a study of the development of architecture, sculpture, and painting from the earliest remains in Chaldea and Egypt through the sixteenth century A. D. Some attention is also given to more recent art. Van Dyke's *College Histories of Art*, Radcliffe's *Schools and Masters of Painting and of Sculpture*, Hoyt's *Painters* and other works are used as text-books. Essays upon the history of art are required.

5. DEBATE

PROFESSOR SANFORD

Six credits (three hours per week)

Both semesters

Open to juniors and seniors who have taken courses 1 (b) and 2 (b); not offered in 1908-9.

This course aims at the training of men in public speaking. It consists of theoretical work in argumentation. Standard debates and orations are analyzed and briefed; original debates are briefed, written, and rehearsed for criticism. Special emphasis is laid upon class-room debate with criticism on delivery, thought, and composition.

6. ADVANCED RHETORIC

ASSISTANT PROFESSOR COMSTOCK

Six credits (three hours per week)

Both semesters

Open to seniors and juniors who have taken courses 1 and 2.

ADVANCED RHETORIC (3)

1, 2 ASSISTANT PROFESSOR COMSTOCK

Open to juniors and seniors who have completed course 2 (a).

Structure and style, theoretically and practically considered, are subjects of study in this course. Some time is given to the oral presentation of topics. In the composition work the student is allowed to select his own subjects and methods of treatment.

This course, in addition to the courses in literature, is required of students who desire a recommendation in English toward a teacher's certificate.

7. ADVANCED RHETORIC

ASSISTANT PROFESSOR COMSTOCK

Six credits (three hours per week)

Both semesters

Open to juniors and seniors who have taken courses 1, 2, and 6.

A continuation of course 6 and conducted along the same lines.

ELOCUTION

8. READING

PROFESSOR SANFORD

Six credits (three hours per week)

Both semesters

Open to sophomores; both semesters must be completed before credit is given for the first semester.

The object of this course is voice building and training in interpretation and expression. The text used is Shakespeare's plays.

10. THE PSYCHOLOGICAL SIDE OF VOCAL EXPRESSION

*ASSISTANT PROFESSOR McDERMOTT

(Three hours)

Both semesters

Open to juniors and seniors who have taken course 1; not offered in 1908-9.

In this course the functions of the dramatic instinct, the will, the intellect, the imagination, and the emotions, are considered independently and conjointly with reference to delivery. The effect upon expression of the neglect of any one of these elements is shown and literature is studied with a view to the harmonious development of all.

11. AMERICAN ORATORY

*ASSISTANT PROFESSOR McDERMOTT

(Three hours)

Both semesters

Open to juniors and seniors who have taken course 1; not offered in 1908-9.

Standard orations are analyzed; synopses, oral biographies, accounts of historical settings, and expositions of the orator's style and logic are required. Forensics and debates are prepared, one original oration each semester is required, a short selection from the oration under consideration is committed for practice in delivery, and short stories from best modern authors are retold for fluent command of English. Besides class work each student is given a brief period for individual criticism; for this reason only a limited number can be admitted.

II. Ancient Languages and Literatures**GREEK**

The requirement for a major in Greek is the completion of eighteen credits from the courses offered by the department; for a minor, twelve credits. For distinction in Greek the special requirements of the department are the completion of at least courses 4 to 7 inclusive, 8 or 9, 10, and two hours per week of seminar work throughout one year.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	First Year Greek	1, 2	10*	All	None
2.	Hist. and Epic Poetry..	1, 2	6*	Soph., Jr., Sr.	Course 1
3.	Xenophon and Herodotus	1, 2	6*	All	See statement
4.	Oratory	1	3	Soph., Jr., Sr.	Course 2 or 3
5.	Philosophy	2	3	Soph., Jr., Sr.	Course 2 or 3
6.	Lyrics	1	3	Jr., Sr.	Course 4 or 5
7.	Tragedy	2	3	Jr., Sr.	Course 5
8.	Philosophy Advanced...	1	3	Jr., Sr.	Course 5
10.	Epic Poetry	2	3	Jr., Sr.	Course 7
11.	Modern Greek	1	3	Soph., Jr., Sr.	Course 2 or 3
12.	Archæology	1, 2	6*	Soph., Jr., Sr.	None
13.	Dramatic Poetry	1, 2	4	Soph., Jr., Sr.	See statement
14.	Composition	1, 2	2*	Jr., Sr.	Courses 4 and 5
15.	Greek Lit. and Life....	1	2	Jr., Sr.	None
16.	Later Greek	1, 2	6	Jr., Sr.	Course 5
17.	Seminar	1	1	Jr., Sr.	Course 4 or 5
18.	Seminar	1	1	Jr., Sr.	Course 5
19.	Epic Poetry .....	..	..	Grad.	
20.	Dramatic Poetry .....	..	..	Grad.	
21.	Oratory .....	..	..	Grad.	
22.	Later Greek.....	..	..	Grad.	
23.	Adv. Mod. Greek.....	..	..	Grad.	

*Both semesters must be completed before credit is allowed for the first semester.

1. FIRST YEAR IN GREEK

PROFESSOR HUTCHINSON

Ten credits (five hours per week)

Both semesters

Open to all; both semesters must be completed before credit is given for the first semester. Students are advised to take this course in their freshman year, especially such as intend to fit themselves for teaching Latin. Those also who expect

to do intensive work in ancient history or philosophy or who expect to study theology or who intend to devote themselves to literature should take this course in the freshman year.

The work of the first semester is based upon Brooks' *Introduction to Attic Greek* and has for its object the mastery of the declensions and conjugations, and the simpler rules of syntax; together with the ability to read readily simple sentences based on the vocabulary of the first chapter of the *Anabasis* which is learned by heart; and to translate into Greek idiomatic English sentences based upon the same text.

In the second semester the *Anabasis* itself is used as the reading book; an amount equivalent to about a book and a half is read. *Hadley's Greek Grammar* is studied systematically. Etymology is reviewed and syntax is studied sufficiently to enable the student to proceed confidently in the translation of the text. The translation from English into Greek is continued.

2. HISTORY AND EPIC POETRY: *Anabasis* and *Iliad*

ASSISTANT PROFESSOR SAVAGE

Six credits (three hours per week)

Both semesters

Open to sophomores, juniors, and seniors, who have completed course 1; credits allowed only when both semesters are taken.

The course is designed for students who have begun Greek in the University. Students who have begun Greek before coming to the University may, with the consent of the department, take Homer during the second semester.

Books 2, 3, and 4 of Xenophon's *Anabasis* are read during the first semester; particular attention is given to syntax and irregular verbs. Selections from Homer's *Iliad* are read during the second semester; special attention is given to prosody, and to poetical forms and usages.

3. HISTORY: Xenophon and Herodotus

ASSISTANT PROFESSOR SAVAGE

Six credits (three hours per week)

Both semesters

Open to freshmen, sophomores, juniors, and seniors, who offer two years of Greek for admission to the University or have completed course 1, and in the judgment of the department are qualified for the work; both semesters must be completed before credit is allowed for the first semester.

Selections from Xenophon's *Cyropædia* are read during the first semester, and special attention is given to syntax and irregular verbs. Selections from Herodotus are read during the second semester, and particular attention is paid to peculiarities of dialect and style. The work is supplemented by lectures on Greek historiography.

4. ORATORY: Lysias and Demosthenes

ASSISTANT PROFESSOR SAVAGE

Three credits (three hours per week)

First semester

Open to those who have completed course 2 or course 3.

The course consists chiefly of readings from the orations of Lysias and Demosthenes; selections from Andocides' speech *On the Mysteries* may also be read. This work is supplemented by lectures on Greek oratory, and some attention is given to the study of Greek rhetoric. At this stage of the student's development less attention is given to syntax, and more attention is paid to matters of literary interest.

5. PHILOSOPHY: Plato's *Apology* and *Crito*.

ASSISTANT PROFESSOR SAVAGE

Three credits (three hours per week)

Second semester

Open to those who have completed course 2 or course 3.

The course consists chiefly in the reading of Plato's *Apology* and *Crito*; and, in connection with these works, selections from Xenophon's *Memorabilia* may also be read. The reading of texts is supplemented by lectures on Greek philosophy.

6. LYRICS

PROFESSOR BROOKS

Three credits (three hours per week)

First semester

Open to juniors and seniors who have completed course 4 or

8. **PHILOSOPHY: Plato's *Republic*** PROFESSOR HUTCHINSON
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed course 5; alternates with course 9.
The Republic of Plato is read, not primarily for its philosophic interest but as one of the masterpieces of Greek literature. The study is, therefore, in the main, a study of literary style.
9. **ORATORY: Demosthenes' *De Corona*** PROFESSOR HUTCHINSON
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed course 4; offered in alternation with course 8; not given in 1908-9.
This course is intended to secure a careful study of the development of oratorical style among the Greeks and its culmination in this acknowledged masterpiece.
10. **ADVANCED COURSE IN EPIC POETRY: The *Odyssey*** PROFESSOR HUTCHINSON
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed course 7.
The object of this course is to secure as intimate an acquaintance as possible, at first hand, with Homer. The Homeric Question is given but scanty attention; its place is in the graduate work (course 19). Literary values receive chief attention and that these may be realized by the student the entire epic is, if possible, read.
11. **MODERN GREEK** PROFESSOR BROOKS
Three credits (three hours per week) First semester
Open to sophomores, juniors and seniors, who have completed course 2 or course 3.
12. **ARCHAEOLOGY** PROFESSOR BROOKS
Six credits (three hours per week) Both semesters
Open to sophomores, juniors and seniors; a knowledge of the Greek language is not required; both semesters must be completed before credit is allowed for the first semester.
A study of the monuments or remains of Greek art, illustrating Greek customs, civilization, and life. Laboratory methods and theses are largely employed.
13. **DRAMATIC POETRY: Euripides and Aristophanes** ASSISTANT PROFESSOR SAVAGE
Four credits (two hours per week) Both semesters
Open in the first semester to those who have completed courses 2, 3, or 7, and in the second to those who have completed the first semester or course 7.
During the first semester, either the *Alcestis* or the *Medea* of Euripides is read; during the second semester the *Frogs* of Aristophanes is studied. Special attention is given to metre, literary style, and mythology, and the work is supplemented by lectures on the authors studied.
14. **GREEK COMPOSITION** PROFESSOR HUTCHINSON
Two credits (one hour per week) Both semesters
Open to juniors and seniors who have completed courses 4 and 5; both semesters must be completed before credit is given for the first semester; recommended to those who expect to teach Greek.
The course consists of a systematic review of Greek syntax and the retranslation into Greek of passages translated from various classic authors, illustrative of various styles.
15. **GREEK LITERATURE AND LIFE** ASSISTANT PROFESSOR SAVAGE
Two credits (two hours per week) First semester
Open to juniors and seniors; a knowledge of Greek is not required.
The course is intended primarily for students who have not had an opportunity to study Greek. It consists of lectures, text book work, and illustrative readings; and, from time to time, the lectures will be illustrated by stereopticon views. The course is especially recommended to students who are intending to teach Greek, Latin, English, or ancient history.

16. **LATER GREEK** PROFESSOR HUTCHINSON
 Six credits (three hours per week) Both semesters
 Open to juniors and seniors who have completed course 5.
 The course consists chiefly of selected readings from the Septuagint and the New Testament.
17. **SEMINAR IN ORATORY OR PHILOSOPHY** PROFESSOR HUTCHINSON
 One credit (one hour per week) First semester
 Open to juniors and seniors who have completed course 4 or course 5.
 In 1908-9 the work will be in connection with Demosthenes' *De Corona*.
18. **SEMINAR IN GREEK TRAGEDY** PROFESSOR BROOKS
 One credit (one hour per week) Second semester
 Open to juniors and seniors who have completed course 5.
19. **ADVANCED COURSE IN EPIC POETRY** PROFESSOR HUTCHINSON
 Open to graduate students only; other arrangements may be ascertained upon application to the department.
20. **ADVANCED COURSE IN GREEK DRAMATIC POETRY** PROFESSOR BROOKS
 Open to graduate students only; other arrangements may be ascertained upon application to the department.
21. **ADVANCED COURSE IN GREEK ORATORY** ASSISTANT PROFESSOR SAVAGE
 Open to graduate students only; other arrangements may be ascertained upon application to the department.
22. **LATER GREEK (322 B. C. to 200 A. D.)** PROFESSOR HUTCHINSON
 Open to graduate students only; other arrangements may be ascertained upon application to the department.
23. **ADVANCED COURSE IN MODERN GREEK** PROFESSOR BROOKS
 Open to graduate students only; other arrangements may be ascertained upon application to the department.

LATIN

The requirement for a major in Latin is the completion of eighteen credits from the courses offered by the department; for a minor, twelve credits. For distinction in Latin the special requirement of the department is the completion of thirty credits from courses offered in the department. To obtain a recommendation for a teacher's certificate in Latin, courses 1, 2, 3, 4, 6, and 7 must be completed; courses 10 and 12 are also recommended.

1. **LIVY: Books I, II, XXI, XXII. Selections** PROFESSORS CLARK AND PIKE, AND ASSISTANT PROFESSOR GRANRUD
 Three credits (three hours per week) First semester
 Open to freshmen who have completed four years of Latin in preparatory schools; course 2 must also be completed before credit is given for this course.
 The course consists of (a) a correct translation of the Latin into idiomatic English with a study of the difference between the idioms of the two languages; (b) Latin composition and review of the principles of Latin syntax.
2. **PLAUTUS AND TERENCE, Selections** PROFESSORS CLARK AND PIKE, AND ASSISTANT PROFESSOR GRANRUD
 Three credits (three hours per week) Second semester
 Open to freshmen who have completed course 1.
 The course comprises the translation of selected plays of Plautus and Terence with an outline study of the beginnings of the Roman drama and also of Roman political institutions.
3. **HORACE** PROFESSOR PIKE AND ASSISTANT PROFESSOR GRANRUD
 Three credits (three hours per week) First semester
 Open to those who have taken courses 1 and 2; course 4 must also be taken before credit is given for this course.
 Selections from the odes, epodes, satires and epistles with a study of the life and literary art of Horace.
4. **ROMAN LITERATURE** PROFESSOR PIKE AND ASSISTANT PROFESSOR GRANRUD
 Three credits (three hours per week) Second semester
 Open to those who have taken courses 1, 2, and 3.
 A brief history of Roman literature with illustrative readings from the most important writers.
5. **OVID** PROFESSOR CLARK
 Two credits (one hour per week) Both semesters
 Open to those who have taken courses 1 and 2; both semesters must be completed before credit is given for the first semester.
 Translations from Ovid's *Fasti*, with a study of the religion and religious ceremonials of the Romans.
6. **ADVANCED COURSE IN CAESAR** PROFESSOR PIKE
 Three credits (three hours per week) First semester
 Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.
 Selections from books five to seven of the Gallic War and from the Civil War. Thorough study of the principles of indirect discourse. Intermediate Latin composition. An amount of time approximately equal to one hour for one-half semester will be spent upon the technical portions of the work, e. g., class drill work and discussion of various problems connected with secondary school work in Latin.
7. **ADVANCED COURSE IN VIRGIL** PROFESSOR PIKE
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.
 An interpretation of selections from books seven and twelve of the *Aeneid*; a study of the quantitative method of pronouncing Latin verse; practice in the metrical rendering of selected passages. An amount of time approximately equal to one hour for one-half semester will be spent upon the strictly technical portions of the subject.
8. **PLINY'S LETTERS** PROFESSOR PIKE
 Two credits (two hours per week) First semester
 Open to those who have completed courses 1 to 4 inclusive.
 Selections from the correspondence of Pliny the Younger with a study of his times.
9. **MEDIEVAL LATIN** PROFESSOR PIKE
 One credit (one hour per week) First semester
 Open to those who have completed courses 1 to 4 inclusive.
 A course intended primarily to assist the student in rendering Latin historical documents of the middle ages. The work consists principally in the reading of selected documents of the middle ages with an outline of the main peculiarities of medieval Latin.

10.

LATIN COMPOSITION

Two credits (two hours per week)

Open to those who have completed courses 1 to 4 inclusive.

A course in advanced Latin composition and a study of Latin prose style.

PROFESSOR PIKE

Second semester
11.

ROMAN ELEGIAC POETRY

Three credits (three hours per week)

Open to those who have completed courses 1 to 4 inclusive.

Selections from Catullus, Tibullus, Propertius, and Ovid, with a study of the rise, development, and characteristics of Roman elegiac poetry.

PROFESSOR CLARK

First semester
12.

CORRESPONDENCE OF CICERO

Two credits (two hours per week)

Open to those who have completed courses 1 to 4 inclusive.

Selections from the letters of Cicero, with a study of his life and the history of his times.

PROFESSOR CLARK

First semester
13.

ROMAN SATIRE

Three credits (three hours per week)

Open to those who have completed courses one to four inclusive.

Selections from Juvenal, Persius, Horace, and from early satire, with a study of the rise, development, and characteristics of Roman satire .

PROFESSOR CLARK

Second semester
14.

ROMAN DRAMA

Two credits (two hours per week)

Open to those who have completed courses 1 to 4 inclusive.

Selections from Seneca's tragedies and from the comedies of Plautus and Terence, with a study of the rise and development of the drama at Rome.

PROFESSOR CLARK

Second semester
15.

ROMAN ARCHEOLOGY AND PUBLIC LIFE

One credit (one hour per week)

Open to juniors and seniors; no knowledge of Latin required.

A study of the city of Rome; the forums; Roman architecture, sculpture, and painting; the Roman assemblies, senate, and magistracies. Lectures with stereopticon views and collateral reading.

ASSISTANT PROFESSOR GRANRUD

First semester
16.

ROMAN PRIVATE LIFE

One credit (one hour per week)

Open to juniors and seniors; no knowledge of Latin is required.

The Roman house, family, dress, food, education, and amusements are studied. Lectures with stereopticon views and collateral reading .

ASSISTANT PROFESSOR GRANRUD

Second semester
17.

LUCRETIVS

Three credits (two hours per week)

Open to graduate students; other arrangements may be ascertained upon application to the department.

The course consists of the reading and interpretation of the text of Lucretius with a study of his philosophy and its sources.

PROFESSOR CLARK

Both semesters
18.

SENECA

Three credits (two hours per week)

Open to graduate students; other arrangements may be ascertained upon application to the department.

Reading, interpretation and annotation of the *de Beneficiis* of Seneca with a study of Stoicism at Rome.

PROFESSOR PIKE

Both semesters
19.

THE HISTORY AND THEORY OF ROMAN ELOQUENCE

Three credits (two hours per week)

Open to graduate students; other arrangements may be ascertained upon application to the department.

The *Brutus* of Cicero will form the basis of the work during the first semester and the *Orator* during the second semester.

ASSISTANT PROFESSOR GRANRUD

Both semesters

SEMITIC LANGUAGES

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Elem. Hebrew	1, 2	6*	Soph., Jr., Sr.	None
2.	Elem. Arabic	1, 2	6*	Jr., Sr.	Course 1
3.	Elem. Aramaic	2	3	Jr., Sr.	Course 1
4.	Hist. Hebrews	1, 2	6	Jr., Sr.	None

*Both semesters must be completed before credit is given for the first semester

1. **ELEMENTARY HEBREW** ASSISTANT PROFESSOR DEINARD
Six credits (three hours per week) Both semesters
Open to sophomores, juniors, and seniors; both semesters must be completed before credit is given for the first semester.
First semester, Harper's *Elements of Hebrew* and reading of easy prose passages from the Old Testament; second semester, critical reading of some book of the Old Testament and a review of Hebrew grammar.
2. **ELEMENTARY ARABIC** ASSISTANT PROFESSOR DEINARD
Six credits (three hours per week) Both semesters
Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.
First semester, Socin's *Arabic Grammar* and the reading of the prose sections contained in it; second semester, selected suras from the Koran and a review of Arabic grammar.
3. **ELEMENTARY ARAMAIC OR SYRIAC** ASSISTANT PROFESSOR DEINARD
Three credits (three hours per week) Second semester
Open to those who have completed course 1.
The course is based upon Strach's *Grammatik des Biblischen Aramaisch* or Brockelman's *Syrische Grammatik*.
4. **HISTORY OF THE HEBREWS TO THE CLOSE OF THE PERSIAN PERIOD** ASSISTANT PROFESSOR DEINARD
Six credits (three hours per week) Both semesters
Open to sophomores, juniors, and seniors; no knowledge of any Semitic language is required.
A survey of the political, social, and religious life of the Hebrews. The English Bible will be used as a text-book, a careful study of the Palestinian, Egyptian, and Assyro-Babylonian inscriptions will be made, and the works of some modern writers on Hebrew history will be consulted.

III. Modern Languages and Literatures

GERMAN

The requirement for a major in German is the completion of eighteen credits from the courses offered by the department; for a minor, twelve credits. For distinction in German the special requirement of the department is the completion of courses 8, 9, 10, and any two of the following: 12, 13, 14, and 17. To obtain the recommendation of the department for a teacher's certificate, courses 4, 6 or 7, 8, 9, 10 and 11 must be completed.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Beginning	1, 2	10†*	All	None
2.	Intermediate	1, 2	6*	Soph., Jr., Sr.	Course 1
3.	Scientific Inter.	1, 2	6*	Soph., Jr., Sr.	Course 1
4.	Prose and Poetry.....	1, 2	6*	All	Two yrs. prep. Ger.
5.	Conversation	1, 2	4*	All	See statement
6.	Drama	1, 2	6*	Soph., Jr., Sr.	Courses 1 and 2, or 4
7.	Adv. Sc. Reading	1, 2	6*	Soph., Jr., Sr.	Courses 2 and 3, or 4
8.	Adv. Conversation	1, 2	4*	Soph., Jr., Sr.	Courses 1 and 2, or 4
9.	Classic Period	1, 2	6*	Jr., Sr.	See statement
10.	Modern Authors	1, 2	6*	Jr., Sr.	See statement
11.	Teachers' Course	2	1	Sr.	Course 10
12.	Reformation	1, 2	4*	Sr. Grad.	Course 9 or 10
13.	Middle High Ger.	1, 2	4*	Sr. Grad.	Course 9 or 10
14.	Old High Ger.	1, 2	4*	Sr.	Course 9 or 10
15.	Seminar on Drama.....	1, 2	..	Grad.	See statement
16.	Volkssied	1, 2	2	Grad.	Course 9 or 10
17.	Hist. of Ger. Lit.	1, 2	4*	Sr. Grad.	Course 9
18.	Sem. on Reading	1, 2	4*	Grad.	See statement

†Juniors and seniors are allowed only half credit.

*Both semesters must be completed before credit is allowed for the first semester.

1. **BEGINNING** PROFESSOR SCHLENKER, ASSISTANT PROFESSORS WILKIN
AND JUERGENSEN, MR. BURKHARD, AND MR. WILLIAMS
Ten credits (five hours per week) Both semesters
Open to all, but juniors and seniors receive only half credit;
both semesters must be completed before credit is given for
the first semester.
Pronunciation, grammar, conversation, and composition; selected reading
in easy prose and verse.
2. **INTERMEDIATE** PROFESSOR SCHLENKER, MR. BURKHARD, AND
MR. WILLIAMS
Six credits (three hours per week) Both semesters
Open to those who have completed course 1 or its equivalent;
both semesters must be completed before credit is given for
the first semester. This course may be supplemented by
course 5. It should be followed by course 6 or course 7.
Students who obtain credit for this course cannot receive
credit also for either course 3 or course 4.
First semester, selections from modern narrative and descriptive prose;
selected lyrics and ballads. Second semester, a drama of Lessing, Goethe,
or Schiller.
3. **SCIENTIFIC INTERMEDIATE** ASSISTANT PROFESSOR JUERGENSEN
Six credits (three hours per week) Both semesters
Open to all who have completed course 1; both semesters must
be completed before credit is given for the first semester.
First semester: *Hodge's German Science Reader* (or equivalent).
Second semester: *Brandt and Day's German Scientific Reading*. This
course aims to give the student a reading knowledge of German for
use in scientific studies.
4. **PROSE AND POETRY** PROFESSOR MOORE, ASSISTANT PROFESSOR
WILKIN, MESSRS. BURKHARD AND WILLIAMS
Six credits (three hours per week) Both semesters
Open to all who enter the University with two years of German;
not open to those who have obtained credit in course 2 or
course 3; both semesters must be completed before credit is
given for the first semester.
First semester: *Meissner's Aus deutschen Landen*; *Goethe's Gedichte*.
Second semester: *Schrakamp's Beruhmte Deutsche*, *Heine's Buch der Lieder*.
Geography, history and legend. Review of German grammar throughout the
year. This course may be supplemented by course 5.
5. **ELEMENTARY CONVERSATION AND COMPOSITION** ASSISTANT PROFESSORS
WILKIN AND JUERGENSEN, MESSRS. BURKHARD AND WILLIAMS
Four credits (two hours per week) Both semesters
Open to those who are taking or have taken course 2, 3, or 4;
not open to those who are taking, or have taken course 9
or course 10; both semesters must be completed before credit is
given for the first semester.
Translation of short English selections; conversation on topics of
everyday life; narrative and descriptive essays and letter writing.
6. **THE DRAMA** PROFESSOR SCHLENKER, ASSISTANT PROFESSORS
WILKIN AND JUERGENSEN, AND MR. BURKHARD
Six credits (three hours per week) Both semesters
Open to those who have taken courses 1 and 2, or course 4;
both semesters must be completed before credit is given for
first semester. This course may be supplemented by course 8.
First semester: Modern drama. Play of Hebbel, Hauptmann, or
Sudermann. Study of the present-day drama in Germany. Assigned readings
and reports. Second semester: Classic drama. Play of Lessing, Goethe, or
Schiller. Study of dramatic structure. History of the German drama in
the eighteenth century.
7. **ADVANCED SCIENTIFIC READING** ASSISTANT PROFESSOR JUERGENSEN
Six credits (three hours per week) Both semesters
Open to those who have taken course 2, 3, or 4; both semesters
must be completed before credit is given for first semester.

8. ADVANCED CONVERSATION, GRAMMAR, AND COMPOSITION

PROFESSOR SCHLENKER, ASSISTANT PROFESSOR WILKIN, AND MR. BURKHARD
 Four credits (two hours per week) Both semesters

Open to those who have completed courses 1 and 2, or course 4;
 both semesters must be completed before credit is given for
 first semester; recommended that it be preceded by course 5;
 required of those who obtain a teacher's recommendation in
 German; intended as a preparation for course 11.

Essays on assigned subjects; oral exercises in German by means of
 discussions on everyday subjects; debates, narration, and the like.

9. GERMAN LITERATURE OF THE CLASSIC PERIOD

PROFESSOR MOORE

Six credits (three hours per week) Both semesters

Open to those who have completed courses 1 and 2 (by special
 permission) or 3 and 7, or 4 and 6; both semesters must be
 completed before credit is given for the first semester; required
 of those who obtain a teacher's recommendation in German.

First semester: Goethe's *Faust*; its genesis; the Faust legend; its
 treatment in literature before and since Goethe's time; plan of Goethe's *Faust*;
 solution of the Faust problem in part two. Lectures and collateral reading;
 essays by the class. Schiller's ballads, and other representative poems of
 this period. German versification. Second semester: Reading and discussion
 of Lessing's more important critiques, the *Laocoon*, and *Dramaturgie*.

10. MODERN AUTHORS

PROFESSOR MOORE

Six credits (three hours per week) Both semesters

Open to those who have completed courses 1, 2, and 9 (by special
 permission), or 4, 6, and 9, or 3, 7, and 9; both semesters
 must be completed before credit is given for the first semester;
 required of those who obtain a teacher's recommendation in
 German.

First semester: Romantic school and *Junge Deutschland*. Second
 semester: German literature since 1848.

11. TEACHERS' COURSE

PROFESSOR MOORE

One credit (one hour per week) Second semester

Open to those who have completed course 10; especially de-
 signed for students who expect to become teachers of German
 in high schools.

12. HISTORY AND LITERATURE OF THE REFORMATION

PROFESSOR MOORE

Four credits (two hours per week) Both semesters

Open to seniors and graduates who have completed course 9 or
 course 10; both semesters must be completed before credit
 is given the first semester.

Brandt, Luther, Hutten, Sachs, Murner, and Fischart. Selec-
 tions from Jansen and Egelhaaf.

13. MIDDLE HIGH GERMAN

PROFESSOR SCHLENKER

Four credits (two hours per week) Both semesters

Open to seniors and graduates who have completed course 9
 or course 10; both semesters must be completed before credit
 is given for the first semester.

Study of the language and literature of the period. Paul's *Mittelhoch-
 deutsche Grammatik*. Selected readings from *Armer Heinrich*, *Nibelungen
 Lied*, *Gudrun*, the poems of Walter von der Vogelweide, *Parsifal*, etc.

14. OLD HIGH GERMAN

PROFESSOR KLAEBER

Four credits (two hours per week) Both semesters

Open to seniors who have taken course 9 or course 10; both
 semesters must be completed before credit is given for the
 first semester.

This course is identical with comparative philology 11.

15. SEMINAR IN GERMAN DRAMA

PROFESSOR SCHLENKER

Two credits (one hour per week) Both semesters

Open to graduates and, by permission of the department, to
 undergraduates but without credit.

An outline of the history of German dramatic literature from its beginning
 to and including the so-called classic drama. Assigned readings, reports,
 and discussions.

16.

THE GERMAN VOLKSLIED

Two credits (two hours per week)

Open to graduate students who have completed course 9 or course 10.

Outline of the history and development of the *Volkslied*. Study of selected numbers in Uhland's *Volkslieder* with references to other general and special collections. Influence of the Volkslied upon lyric and ballad writers.
- MR. WILLIAMS

Second semester
17.

HISTORY OF GERMAN LITERATURE

Four credits (two hours per week)

Open to seniors and graduates who have completed course 9; both semesters must be completed before credit is given for the first semester.

Lectures in German on the history of German literature. Reviews and topical research on the part of the students.
- ASSISTANT PROFESSOR JUERGENSEN

Both semesters
18.

SEMINAR IN SCIENTIFIC READING

Four credits (two hours per week)

Open to graduate students who have completed course 9 or 10, and (by permission of the department) to undergraduates who have completed course 9 or 10; both semesters must be completed before credit is given for the first semester.

1908-9 The literature of evolution (Haeckel, Reinke, et al.)

1909-10 Chemistry and physics (Ostwald, Helmholtz, et al.)

1910-11 Psychology and philosophy (especially Wundt.)

For courses in Germanic philology see the statement of the department of comparative philology, pp. 52-53.
- ASSISTANT PROFESSOR JUERGENSEN

Both semesters

ROMANCE LANGUAGES

The requirement for a major in French or Spanish is the completion of eighteen credits from the courses offered in those subjects; for a minor, twelve credits. For distinction in French the special requirement of the department is the completion of courses 2 or 3, 5, 7, and four credits from courses 6, 8, 9, or 10; for distinction in Spanish the required courses are 5, 11, 12, and 13.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Begin. French	1, 2	10†*	All	None
2.	Intermediate French	1, 2	6*	Soph., Jr., Sr.	Course 1
3.	Adv. Fr. G. and Comp.	1, 2	6*	All	None
4.	Begin. Fr. Conversation.	1, 2	4*	Soph., Jr., Sr.	See statement
5.	Classic Fr. Lit.	1, 2	6*	Soph., Jr., Sr.	Course 2 or 3
6.	Adv. Fr. Conversation.	1, 2	4*	Soph., Jr., Sr.	Course 2 or 3
7.	Fr. Lit. of 19 Cent.	1, 2	6*	Soph., Jr., Sr.	Course 2 or 3
8.	Teachers Fr.	1, 2	2*	Jr., Sr.	Course 5
9.	Romance Phil.	1, 2	2*	Jr., Sr.	Course 5
10.	Italian Lit.	1, 2	2*	Jr., Sr.	Course 5
11.	Begin. Span.	1, 2	10*	Soph, Jr., Sr.	Two yrs. prep. Fr.
12.	Intermediate Span.	1, 2	6	Soph., Jr., Sr.	Course 11
13.	Adv. Span.	1, 2	6*	Jr., Sr.	Course 12
14.	Old French	1, 2	4	Grad.	
15.	Hist. of Fr. Lit.	1, 2	6*	Grad.	
16.	Ital. Lit.	1, 2	2*	Grad.	Course 5

*Both semesters must be completed before credit is given for the first semester.

†Juniors and seniors receive only half credit.

1.

BEGINNING FRENCH

Ten credits (five hours per week)

Open to all, but juniors and seniors receive only half credit; both
- ASSISTANT PROFESSORS ANDRIST AND FRELIN,

MADAM BERTIN

Both semesters

2. **INTERMEDIATE FRENCH** ASSISTANT PROFESSOR FRELIN AND MADAM BERTIN
 Six credits (three hours per week) Both semesters
 Open to sophomores, juniors and seniors who have completed course 1; both semesters must be completed before credit is given for the first semester.
François Advanced French Prose Composition: modern texts will be read, including some of the works of Coppée, Mérimée, Daudet, Scribe, et al.
3. **ADVANCED FRENCH GRAMMAR AND COMPOSITION** ASSISTANT PROFESSOR ANDRIST
 Six credits (three hours per week) Both semesters
 Open to all who enter the University with two years of French; both semesters must be completed before credit is given for the first semester.
François' Introduction to French Composition; readings from modern authors, including selections from Coppée, Feuillet, Sandeau.
4. **BEGINNING FRENCH CONVERSATION** ASSISTANT PROFESSORS ANDRIST AND FRELIN, MADAME BERTIN
 Four credits (two hours per week) Both semesters
 Open to those who have completed or who are taking course 2 or course 3; both semesters must be completed before credit is given for the first semester.
 Conversations based on modern French life.
5. **THE CLASSICAL PERIOD OF FRENCH LITERATURE** PROFESSOR BENTON
 Six credits (three hours per week) Both semesters
 Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.
 The reading of works and selections produced during the classical period of French literature and conversations in French concerning the same. The works of Corneille, Racine, Molière, La Fontaine, et al. Compositions.
6. **ADVANCED FRENCH CONVERSATION** PROFESSOR BENTON
 Four credits (two hours per week) Both semesters
 Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.
 Conversations on French history, literature, the drama, etc.
7. **FRENCH LITERATURE OF THE NINETEENTH CENTURY** PROFESSOR BENTON
 Six credits (three hours per week) Both semesters
 Open to those who have completed course 2 or course 3 and course 5; both semesters must be completed before credit is given for the first semester.
 Lectures in French on the history of modern literature. Select works of some of the authors read and discussed. Compositions and essays.
8. **TEACHERS' COURSE IN FRENCH** PROFESSOR BENTON
 Two credits (one hour per week) Both semesters
 Open to those who have completed course five; both semesters must be completed before credit is given for the first semester.
 Special practice in pronunciation. Discussion in French of methods of teaching the French language and literature.
9. **ROMANCE PHILOLOGY** PROFESSOR BENTON
 Two credits (one hour per week) Both semesters
 Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.
 Lectures on the phonetical development of the French and other Romance languages from popular Latin. Reading of old French texts.
10. **ITALIAN LITERATURE** PROFESSOR BENTON
 Two credits (one hour per week) Both semesters
 Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.
Edgren's Italian Grammar, Dante's *Divine Comedy*.

11. **BEGINNING SPANISH** MR. MELOM
 Ten credits (five hours per week) Both semesters
 Open to sophomores, juniors, and seniors. Both semesters must
 be completed before credit is given for the first semester.
 Monsanto and Languellies's *Spanish Course-Josselyn*. Worman's *First Spanish Book*. Bransby's *Spanish Reader*.
12. **INTERMEDIATE SPANISH** MR. MELOM
 Six credits (three hours per week) Both semesters
 Open to those who have completed course 11; both semesters must
 be completed before credit is given for the first semester.
 First semester: Loiseaux, *Spanish Composition*; Brownell, *El Pajaro Verde*. Second semester: Gray's *Fortuna*; Alarcon's *El Capitan Veneno*.
13. **ADVANCED SPANISH** MR. MELOM
 Six credits (three hours per week) Both semesters
 Open to those who have completed course 11 and 12; both semesters must be completed before credit is given for the first semester.
 F. Solderilla, *Compendio de la Literatura Espanola*; Alarcon's *El Sombrero de Tres Picos*. Lectures and collateral readings of representative Spanish authors.
14. **ROMANCE LANGUAGES OLD FRENCH** PROFESSOR BENTON
 Four credits (two hours per week) Both semesters
 Open to graduate students; other arrangements may be ascertained upon application to the department.
 Comparative phonetics and grammar of French and other Romance languages. Some of the oldest monuments of the French language are studied and the phonetic changes compared with modern French and English. Special attention is given to the period when French words came into the English language.
15. **HISTORY OF FRENCH LITERATURE** PROFESSOR BENTON
 Two credits (one hour per week) Both semesters
 Open to graduate students; both semesters must be completed before credit is given for the first semester.
 A discussion of the evolution of the various schools and doctrines in French literature.
16. **ITALIAN LITERATURE** PROFESSOR BENTON
 Two credits (one hour per week) Both semesters
 Open only to graduate students who have completed course 5; both semesters must be completed before credit is given for the first semester.
 History of Italian Literature, special: *The Divine Comedy*.

SCANDINAVIAN LANGUAGES

The requirement for a major in the Scandinavian languages is the completion of eighteen credits from courses offered by the department; for a minor, twelve credits.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Elem. Norwegian	1, 2	10*†	All	None
2.	Adv. Norwegian	1, 2	6*	Soph., Jr., Sr.	Course 1
3.	Elem. Swedish	1, 2	10*†	All	None
4.	Adv. Swedish	1, 2	6*	Soph., Jr., Sr.	Course 3
5.	Old Norse (Icelandic) ..	1, 2	4	Jr., Sr., Grad.	Courses 1 and 2, or 3 and 4
6.	Modern Norwegian Lit..	1, 2	6*	Jr., Sr., Grad.	Courses 1 and 2
7.	Swedish Literature	1, 2	6*	Jr., Sr., Grad.	Courses 3 and 4
8.	Henrik Ibsen	1	2*	Jr., Sr., Grad.	See statement
9.	History of Northern Europe	1, 2	6	Jr., Sr.	None

*Both semesters must be completed before credit is given for the first semester

1. **ELEMENTARY NORWEGIAN** PROFESSOR BOTHNE
 Ten credits (five hours per week) Both semesters
 Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester.
 Elementary study of the language, grammar, composition, select reading in easy prose and poetry.
2. **ADVANCED NORWEGIAN** PROFESSOR BOTHNE
 Six credits (three hours per week) Both semesters
 Open to those who have completed course 1 and to others with the permission of the department; both semesters must be completed before credit is given for the first semester.
 Grammar, composition, conversation, elementary history of literature, and select works of modern authors.
3. **ELEMENTARY SWEDISH** PROFESSOR STOMBERG
 Ten credits (five hours per week) Both semesters
 Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester.
 Grammar and composition; select reading in easy prose and verse.
4. **ADVANCED SWEDISH** PROFESSOR STOMBERG
 Six credits (three hours per week) Both semesters
 Open to those who have completed course 3 and to others with the permission of the department; both semesters must be completed before credit is given for the first semester.
 First semester: grammar and composition. Modern prose texts will be read. Second semester: an elementary history of the literature of Sweden and reading of Tegnér's *Frithjofs Saga* and Runeberg's *Fänrik Stals Sägner*.
5. **OLD NORSE (Icelandic)** PROFESSOR BOTHNE
 Four credits (two hours per week) Both semesters
 Open to those who have completed courses 1 and 2, or 3 and 4, and to other qualified students with the approval of the department.
 Grammar and reading. *Gunnlaugs Saga Ormstungu*.
6. **MODERN NORWEGIAN LITERATURE** PROFESSOR BOTHNE
 Six credits (three hours per week) Both semesters
 Open to those who have completed courses 1 and 2; both semesters must be completed before credit is given for the first semester.
 History of Norwegian literature from 1814 to the present day. Special attention paid to Björnson and Ibsen.
7. **SWEDISH LITERATURE** PROFESSOR STOMBERG
 Six credits (three hours per week) Both semesters
 Open to qualified students upon the approval of the department; both semesters must be completed before credit is given for the first semester.
 History of the literature and study of modern authors, including Selma Lagerlöf, Geijerstam, Strindberg.
8. **IBSEN** PROFESSOR BOTHNE
 Two credits (two hours per week) First semester
 Open to qualified students upon the approval of the department.
 Lectures and readings.
9. **HISTORY OF NORTHERN EUROPE** PROFESSOR STOMBERG
 Six credits (three hours per week) Both semesters
 Open to juniors and seniors; no knowledge of the Scandinavian languages is required.
 The course includes the history of the Scandinavian countries from the earliest period to recent times.
10. **EARLY NORWEGIAN LITERATURE** PROFESSOR BOTHNE
 (Not given in 1908-9.)
11. **MODERN DANISH LITERATURE** PROFESSOR BOTHNE
 (Not given in 1908-9.)

FOR GRADUATES

12. MODERN SWEDISH LANGUAGE AND LITERATURE

13. HISTORY OF THE SCANDINAVIAN LANGUAGES

For courses in Scandinavian philology, see the statement of the department of comparative philology, pp. 52-53.

IV. Biological Sciences

ANIMAL BIOLOGY

The requirements for a major in animal biology are the completion of course one and twelve additional credits from related courses; for a minor, twelve credits. For distinction in animal biology the special requirements of the department are the completion of a major and at least six additional credits from courses offered by the department. To obtain the recommendation of the department for a teacher's certificate courses one, fifteen, or two, or three, or four, or five, and twelve additional credits in the biological sciences, six of which shall be in botany, must be completed.

Students who contemplate taking a major or advanced work in animal biology are advised to confer with the head of the department in planning their work.

Journal Club. The professors, instructors, and advanced students of the department meet once a week to review and discuss current zoological literature and to listen to reports from those carrying on investigations.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Gen. Zoology	1, 2	6	All	None
2.	Morfol. Invertebrates ..	1, 2	6*	Soph., Jr., Sr.	Course 1
3.	Histol.-Embryol.	1, 2	6	Soph., Jr., Sr.	Course 1
4.	Comp. Ant. Vertebrates.	1, 2	6	Soph., Jr., Sr.	Course 1
5.	Gen. Physiol.	1, 2	6*	Soph., Jr., Sr.	Course 1
7.	Entomol.	1, 2	6*	Soph., Jr., Sr.	Course 1
8.	Ichthyology	1	3	Soph., Jr., Sr.	Course 1
9.	Ornithology	2	3	Soph., Jr., Sr.	Course 1
11.	Animal Habits—Intel. ..	2	2	Jr., Sr.	See statement
13.	Teachers' Course	1	1	Jr., Sr.	Eighteen credits
14.	Problems & Research...	1, 2	6 or 12*	Jr., Sr.	See statement
15.	Elements of Entomol. & Ornith.	1, 2	6*	Soph., Jr., Sr.	Course 1

*Both semesters must be completed before credit is given for the first semester.

1. GENERAL ZOOLOGY

PROFESSOR SIGERFOOS, ASSISTANT PROFESSOR

OESTLUND, BROWN, DOWNEY, AND MR. JOHNSON

Six credits (six hours per week)

Both semesters

Open to all; the laboratory fee is three dollars per semester.

This course is a comparative study of the principles of structure, physiology, and development in animals. In the laboratory a brief study of insects and the dissection of the frog are used as a practical introduction to the course. Then follow a study of cell structure and cell division, a systematic study of representatives of the chief phyla or branches of the animal kingdom, and a study of the elements of embryology as illustrated by the development of the starfish and chick. Lectures, quizzes, and laboratory work. Text-book required: Hertwig's *Manual of Zoology*

2. MORFOLOGY OF INVERTEBRATES

PROFESSOR SIGERFOOS AND MR. JOHNSON

Six credits (six hours per week)

Both semesters

Open to those who have completed course one; both semesters

must be completed before credit is given for the first semester;

the laboratory fee is three dollars per semester.

The object of this course is to familiarize the student with the methods and principles of zoology thru an intensive study of two or three groups of animals and to acquaint him with the minor phyla not considered in course one. During the year 1908-9 the Protozoa and Crustacea will be the groups especially taken up.

3. **ESSENTIALS OF HISTOLOGY AND EMBRYOLOGY** PROFESSOR NACHTRIEB
AND ASSISTANT PROFESSOR DOWNE

Six credits (six hours per week) Both semester
Open to those who have completed course 1; the laboratory fee
is three dollars per semester.

In this course are taken up the development and minute structure of the animal as an organism built up of tissues combined into organs, and the student is given practice in general methods, technique, and the use of apparatus. The course prepares directly for most of the advanced courses. Lectures, quizzes, and laboratory work.

4. **COMPARATIVE ANATOMY OF VERTEBRATES** ASSISTANT PROFESSOR BROWN
AND MR. JOHNSON

Six credits (six hours per week) Both semester
Open to those who have completed course 1 or its equivalent;
both semesters must be completed before credit is given for
the first semester; the laboratory fee is three dollars per
semester.

The first semester's work is based upon a study of chordates, cartilaginous and bony fishes and all classes up to mammalia; the second semester to a detailed study of the cat and comparative studies of the rabbit, sheep, and man. Lectures, quizzes, and laboratory work. Required text books: Davidson's *Mammalian Anatomy* and *Burkholder's Anatomy of the Brain*.

5. **GENERAL PHYSIOLOGY** PROFESSOR NACHTRIEB

Six credits (three hours per week) Both semester
Open to those who have completed course one; both semesters
must be completed before credit is given for the first semester.

In the first semester are considered the physical, structural, and functional features of living substance; the cell, present conditions, and expressions of life; and the theories of the origin of life and death. Demonstrations and simple experiments constitute an essential part of the course in both semesters.

In the second semester the life of the cell is considered in its relations to that of other cells and the course is concluded with special reference to the teaching of physiology in high schools.

6. **EXPERIMENTAL ZOOLOGY**

Six credits (six hours per week) Both semester
Open to those who have completed courses 1 and 3; both semesters must be completed before credit is given for the first semester; not given in 1908-9.

7. **ENTOMOLOGY** ASSISTANT PROFESSOR OESTLUND

Six credits (six hours per week) Both semester
Open to those who have completed course 1; both semesters
must be completed before credit is given for the first semester.

The course covers, in general, the elements of entomology, structure, functions, development, and economics, leading up to a discussion of the principles of taxonomy and their application to the classification of insects. Folsom's *Entomology*, and Hertwig's *Zoology* are used as text-books and general guides.

8. **ICHTHYOLOGY** ASSISTANT PROFESSOR BROWN

Six credits (six hours per week) First semester
Open to those who have completed course 1; the laboratory fee
is three dollars.

This course includes lectures, quizzes, and laboratory work in the structure, classification, life history, and culture of fishes, with special reference to the fishes of our inland waters which are of economic importance.

9. **ORNITHOLOGY** ASSISTANT PROFESSOR BROWN

Six credits (six hours per week) Second semester
Open to those who have completed course 1; the laboratory fee
is three dollars.

This course includes lectures, quizzes, laboratory and field work in the structure, classification, nest building, food, habits, and distinction of birds. The lectures consider the subjects of migration, coloration, flight, etc. Practical demonstrations are given of the preparation of birds and eggs for scientific purposes. Required: Chapman's *Hand-Book of Birds of Eastern North America*.

- 10. HISTORY OF ZOOLOGY** PROFESSOR NACHTRIEB
Two credits (two hours per week) First semester
Open to juniors and seniors; students are advised to complete course 1 before electing this course; not offered in 1908-9.
A course of lectures on the history of zoology from ancient times to the present, including a brief history of our domestic animals and those that have become extinct within historic times, and a discussion of the modern theories and problems of heredity and evolution.
- 11. ANIMAL HABITS AND INTELLIGENCE** PROFESSOR NACHTRIEB
Two credits (two hours per week) Second semester
Open to juniors and seniors; students are advised to complete course 1 before electing this course; alternates with course twelve.
The course consists of lectures and discussions on animal habits and intelligence, and concludes with a consideration of the development of mental power in animals.
- 12. ECONOMIC ZOOLOGY** PROFESSOR NACHTRIEB
Two credits (two hours per week) Second semester
Open to juniors and seniors; alternates with course 11; not given in 1908-9.
Lectures on the uses made of animals and their products, the production and protection of those animals of special economic importance, and the methods of protection against some of the disease-producing animals.
- 13. TEACHERS' COURSE** PROFESSOR NACHTRIEB AND ASSISTANTS
One credit (one hour per week) First semester
Open to those who have completed a minor in zoology; given in alternate years.
Lectures and discussions on the ends to be attained through courses in general zoology and the methods and means by which such ends may be gained.
- 14. PROBLEMS AND RESEARCH** PROFESSOR NACHTRIEB AND ASSISTANTS
Six or twelve credits (six or twelve hours per week) Both semesters
Open to those who have completed courses 1 and 3 or 1 and such other work as may be required by the instructor in charge; both semesters must be completed before credit is given for the first semester.
The course consists of advanced or essentially independent work carried on in some specific line under the direction of the professor in charge of that work. The lines of work open at present are:—
(a) Morphology of vertebrates under Assistant Professor Brown
(b) Blood, connective tissue and excretory organs of vertebrates under Assistant Professor Downey
(3) Entomology under Assistant Professor Oestlund
(d) Experimental zoology
(e) General physiology under Professor Nachtrieb
(f) Invertebrate embryology under Professor Sigerfoos
(g) Invertebrate morphology under Professor Sigerfoos
(h) Vertebrate embryology or morphology under Professor Nachtrieb.
- 15. ELEMENTS OF ENTOMOLOGY AND ORNITHOLOGY** ASSISTANT PROFESSORS OESTLUND AND BROWN
Six credits (six hours per week) Both semesters
Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.
This course is planned with special reference to candidates for the teacher's certificate. During the first semester the class meets with Assistant Professor Oestlund during the third and fourth hours on Monday, Wednesday and Friday. During the second semester the class meets with Assistant Professor Brown on Monday, Wednesday and Friday at the hours arranged with him.

BOTANY

The requirement for a major in botany is the completion of eighteen credits from the courses offered by the department; for a minor twelve credits. For distinction in botany the special requirement of the department

is the completion of courses 1, 2, and 3, and any advanced course covering two semesters. To obtain a teacher's certificate courses 1 and 2, and twelve additional credits in biological sciences, of which six shall be in animal biology, must be completed.

Students entering the department for the first time must take course 1, or present a satisfactory equivalent. Courses 1 and 2 are required for entrance to all advanced courses, with the exception of eleven to fifteen. Students are requested to confer with the head of the department before electing an advanced course.

The *Botanical Seminar* consists of advanced students in botany, together with the staff of the department. It meets every two weeks for the presentation of the results of investigation, and for the discussion of current problems.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Gen. Botany	1, 2	6*	All	None
2.	Adv. Botany	1, 2	6	Soph., Jr., Sr.	Course 1
3.	Plant Phys. and Ecol...	1, 2	6	Soph., Jr., Sr.	See statement
4.	Algae	1, 2	6	Jr., Sr.	Courses 1 and 2
5.	Fungi	1, 2	6	Jr., Sr.	Courses 1 and 2
6.	Mosses and Ferns.....	1, 2	6	Jr., Sr.	Courses 1 and 2
7.	Flowering Plants	1, 2	6	Jr., Sr.	Courses 1 and 2
8.	Ecology	1, 2	6	Jr., Sr.	Courses 1, 2 and 3
9.	Plant Physiol.	1, 2	6	Jr., Sr.	Courses 1, 2 and 3
10.	Cytology	1, 2	6	Jr., Sr.	Courses 1 and 2
11.	Industrial Botany	1, 2	6	Soph., Jr., Sr.	See statement
12.	Wood Technology	1	6	Soph., Jr., Sr.	Course 1
13.	Water Supply Botany..	2	3	Soph., Jr., Sr.	Course 1
14.	Timber and Timber Diseases	1	3	Soph., Jr., Sr.	Course 1
15.	Bot. Microchemistry....	1, 2	3	Soph., Jr., Sr.	Course 1
16.	Plant Studies	1, 2	3	Jr., Sr.	Courses 1 and 2
17.	Morph. and Taxonomy..	1, 2	..	Grad.	See statement
18.	Problems in Algology...	1, 2	..	Grad.	See statement
19.	Problems in Phys. and Ecology	1, 2	..	Grad.	See statement
20.	Problems in Cytology...	1, 2	..	Grad.	See statement

*Both semesters must be completed before credit is given for the first semester.

GENERAL COURSES

Required for entrance to any special course, except those in technical botany 11 to 15 inclusive.

- GENERAL BOTANY** PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL, MR. HUFF AND MR. BUTTERS
Six credits (six hours per week) Both semesters
Open to all; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

A general survey of the subject, comprising laboratory study of the evolution and relationships of plants, greenhouse study of their behavior and structure, and field work in the identification and distribution of flowering plants. Lectures and quizzes, laboratory, greenhouse and field work.

- ADVANCED BOTANY** PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL
Six credits (six hours per week) Both semesters
Open to those who have completed course 1; the laboratory fee is three dollars per semester.

A study of the structure and classification of the great groups of plants, based on identification; the details of cell-division, of the formation of tissues and of reproduction; and the general relations of the plant to the physical

SPECIAL COURSES

3. **PLANT PHYSIOLOGY AND ECOLOGY** PROFESSOR CLEMENTS AND MR. HUFF
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1 and 2; by permission of the department the course may be taken in conjunction with course 2; the laboratory fee is three dollars per semester.

A study of the factors that affect the plant and its response to them; the adaptations of plants and the origin of new forms; the structure and development of vegetation, as shown in migration, invasion, competition, etc. Lectures and quizzes, greenhouse and field work.

4. **ALGAE** ASSISTANT PROFESSOR TILDEN
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

A detailed comparative study of the structure and classification of the algae; the blue-green and yellow-green algae, together with a systematic examination of forms in the Minneapolis water supply, occupy the first semester, and the brown and the red marine algae the second semester. Lectures, laboratory and reference work.

5. **FUNGI** PROFESSOR CLEMENTS
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The classification and life-history of the various groups of fungi, based on identification, cultures and field work, with particular reference to forms which cause plant and animal diseases. Lectures and discussions, laboratory, greenhouse and field work.

6. **MOSSES AND FERNS** ASSISTANT PROFESSOR ROSENDAHL AND MR. HUFF
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The course is designed for students who wish to pay special attention to the morphology and taxonomy of liverworts, mosses, and ferns. Lectures, laboratory and field work.

7. **FLOWERING PLANTS** ASSISTANT PROFESSOR ROSENDAHL
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The course is designed to afford the student an opportunity to become proficient in the determination of plant species and plant types, as well as to show the genetic development and relationships of the flowering plants. Lectures, reference reading, laboratory, greenhouse and herbarium work, together with field work in the fall and spring.

8. **ECOLOGY** PROFESSOR CLEMENTS
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1, 2 and 3; the laboratory fee is three dollars per semester.

A critical study of plant habitats by means of instruments, and the adaptations produced by water and by light, together with a careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work.

9. **PLANT PHYSIOLOGY** PROFESSOR CLEMENTS
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1, 2 and 3; the laboratory fee is three dollars per semester; alternates with course 8.

A study of the relations of factor, function and structure in the various organs of the plant, with special reference to absorption, transpiration, photosynthesis, respiration, irritability and reproduction. Class discussions and quizzes, greenhouse and field work.

- 10. CYTOLOGY** ASSISTANT PROFESSOR ROSENDAHL
Six credits (six hours per week) Both semester
Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.
The course includes a survey of cell structure and the various phenomena of division, fusion and metamorphosis, together with a review of the history of cytologic investigation. Methods of cytological research indicated in the laboratory. Laboratory work and collateral reading.
- 11. INDUSTRIAL BOTANY** ASSISTANT PROFESSOR TILDE
Six credits (six hours per week) Both semester
Open to technical students who have completed course 1, and to academic students who have completed courses 1 and 2; the laboratory fee is three dollars per semester.
A study of the origin, distribution and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.
- 12. WOOD TECHNOLOGY** PROFESSOR CLEMENTS AND MR. BUTTER
Six credits (six hours per week)
Open to those who have had course 1; the laboratory fee is three dollars per semester.
A critical study of the most important woods, with especial reference to their structure, differences, and uses, and the life history and relationship of the various genera.
- 13. WATER SUPPLY BOTANY** ASSISTANT PROFESSOR TILDE
Three credits (six hours per week) Second semester
Open to those who have completed course 1; the laboratory fee is three dollars.
A technical course for municipal, sanitary and reclamation engineers involving the determination of the forms prevalent in storage waters and in water supplies, and their abundance, together with methods of control or prevention. Lectures and references, laboratory and field work.
- 14. TIMBER AND TIMBER DISEASES** MR. HUF
Three credits (six hours per week) First semester
Open to those who have completed course 1; the laboratory fee is three dollars.
A study of the source and structure of the important timbers with particular reference to their mechanical properties, together with a study of timber diseases, and methods of timber preservation. Lectures, laboratory work, and references.
- 15. BOTANICAL MICROCHEMISTRY** PROFESSOR CLEMENT
Six credits (six hours per week) Both semester
Open to those who have completed course 1; laboratory fee is three dollars.
A microscopical study by means of stains and reagents of the nature and structure of plant substances, in the natural condition as well as in the finished product. Lectures, laboratory and reference work.
- 16. PLANT STUDIES AND METHODS** PROFESSOR CLEMENT
Six credits (six hours per week) Both semester
Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.
A course for teachers and for students intending to teach; the subjects of nature study and high school botany are presented as they are to be taught and not from the university point of view; the material is taken up in detail in its proper sequence, and training in method is afforded as far as possible by practice in the elementary school of the College of Education.

GRADUATE COURSES

- 17. MORPHOLOGY AND TAXONOMY** ASSISTANT PROFESSOR ROSENDAHL
Both semester
Open to graduate students; other arrangements may be ascertained upon application to the department
Important literature and necessary material will be provided for whatever research is entered upon, and the results of the investigations will be required to be prepared for publication. The course is an elastic one and will be adapted to the special training and requirements of those pursuing it.

18. PROBLEMS IN ALGOLOGY

ASSISTANT PROFESSOR TILDEN
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be done on special groups or along any of the following lines: The freshwater algae of Minnesota; the algae of the Minneapolis and St. Paul water supplies; the algae of hot springs; lime-depositing algae; arctic marine algae (material from Vancouver Island); tropical marine algae (material from the Hawaiian Islands). Special facilities for study are offered by the Minnesota Seaside Station on Vancouver Island, which is open during the summer vacation.

19. PROBLEMS IN PHYSIOLOGY AND ECOLOGY

PROFESSOR CLEMENTS
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Opportunity for research work in ecology and physiology is offered along the following lines: Critical investigation of the physical factors of the habitat by means of instruments; studies in plant functions and adaptations; the experimental production of new forms; investigations in the development and structure of vegetation, and especially in migration, competition, etc.

20. PROBLEMS IN CYTOLOGY AND EMBRYOLOGY

PROFESSOR CLEMENTS
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be taken along any of the following lines: The minute structure of the cell; microchemistry of the cell; development of sporangia and spores; fecundation; development of the embryo; origin and development of the primary tissues; development of organs; correlation, etc.

V. Physical Sciences

CHEMISTRY

The requirement for a major in chemistry is the completion of eighteen credits from courses offered by the department; for a minor, twelve credits. To obtain the recommendation of the department for a teacher's certificate courses 1 and 2, and six additional credits in physical sciences must be completed.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Gen. Chem.	1, 2	6†*	All	Course 4
2.	Adv. Gen. Chem.	1, 2	6*	All	Course 3
3.	Qual. Anal.	1, 2	6	Soph., Jr., Sr.	Course 3
4.	Quant. Anal. (Grav.)...	1	3	Jr., Sr.	See statement
5.	Quant. Anal. (Vol.)....	2	3	Jr., Sr.	None
6.	Organic Chem.	2	6	Jr., Sr.	Course 2
7.	Teachers	2	1	Sr.	Course 3
8.	Spec. Inorganic ....	..	..	Grad.	
9.	Electro-Chem. ....	..	..	Grad.	
10.	Organic Chem. ....	..	..	Grad.	
11.	Alkaloids ....	..	..	Grad.	
12.	Analytical Chem. ....	..	..	Grad.	

*Both semesters must be completed before credit is given for the first semester.

†Juniors and seniors are allowed only half credit.

1. GENERAL CHEMISTRY

MISS COHEN AND MR. BADGER
Both semesters

Six credits (six hours per week)

Open to all who do not present any entrance credits in chemistry, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; the laboratory fee is five dollars per semester.

Recitation and laboratory work. The course includes a study of the common elements and their compounds, with an introduction to the modern theories of chemistry.

2. **ADVANCED GENERAL CHEMISTRY** PROFESSOR FRANKFORTER, MISS COHEN, AND MR. BADGER
Six credits (six hours per week) Both semesters
Open to all who have completed a satisfactory course in general chemistry; both semesters must be completed before credit is given for the first semester; the laboratory fee is five dollars per semester.
Lectures and laboratory work. The ground covered includes an introduction to physical and technological chemistry with an exhaustive study of the chemical elements.
3. **QUALITATIVE ANALYSIS** ASSISTANT PROFESSOR NICHOLSON AND MR. FRARY
Six credits (six hours per week) Both semesters
Open to those who have completed course 2; the laboratory fee is five dollars per semester.
Lectures and laboratory work, with recitations and collateral reading. The course includes the general reactions of the metals and acids with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.
4. **QUANTITATIVE ANALYSIS (Gravimetric)** PROFESSOR SIDENER
Three credits (six hours per week) First semester
Open to those who have completed course 3; the laboratory fee is five dollars.
Lectures and laboratory work. The course includes an introduction to quantitative and a beginning of gravimetric analysis.
5. **QUANTITATIVE ANALYSIS (Volumetric)** PROFESSOR SIDENER
Three credits (six hours per week) Second semester
Open to those who have completed course 4; the laboratory fee is five dollars.
Lectures and laboratory work. The course includes an introduction to volumetric analysis with a discussion of standard solutions and the necessary stoichiometric calculations.
6. **ORGANIC CHEMISTRY** PROFESSOR FRANKFORTER, ASSISTANT PROFESSORS DERBY AND HARDING
Six credits (six hours per week) Both semesters
Open to those who have completed course 3.
Lectures and laboratory work. The course includes the aliphatic and aromatic series with a preparation of the more important compounds.
7. **TEACHERS' COURSE** MISS COHEN
One credit (one hour per week) Second semester
Open to seniors who have completed course 3.
This course is specially arranged for students who expect to teach. The course will be largely didactic, with the experimental work necessary to a thorough understanding of the new methods and theories.
8. **SPECIAL INORGANIC CHEMISTRY**
Open to graduate students; other arrangements may be ascertained upon application to the department.
9. **ELECTRO-CHEMISTRY**
Open to graduate students; other arrangements may be ascertained upon application to the department.
10. **ORGANIC CHEMISTRY**
Open to graduate students; other arrangements may be ascertained upon application to the department.
11. **THE ALKALOIDS**
Open to graduate students; other arrangements may be ascertained upon application to the department.
12. **ANALYTICAL CHEMISTRY**
Open to graduate students; other arrangements may be ascertained upon application to the department.

GEOLOGY AND MINERALOGY

The requirement for a major in geology and mineralogy is the completion of eighteen credits from the courses offered by the department; for a minor, twelve credits. No recommendation for a teacher's certificate in geology and mineralogy is issued, but a minor recommendation to go with similar recommendations in biological or physical sciences may be obtained.

Students who desire to take double courses in geology may do so by electing any of the following combinations: First semester, 1 and 2, 1 and 6, 1 and 10, 6 and 7, 7 and 8, 10 and 12; second semester, 3 and 4, 5 and 6, 7 and 9, 7 and 10. By vote of the faculty, credit will be given to students who satisfactorily complete any of the general field courses in geology offered in the joint announcement of various universities for the summer of 1908.

GEOLOGY

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Gen. Geol.	1	3	Jr., Sr.	None
2.	Ess. Phys. Geog.	1	3	Jr., Sr.	None
3.	Indust. Geog.	2	3	Jr., Sr.	Course 1 or 2
4.	Elements of Meteorology	2	3	Jr., Sr.	Course 1 or 2
5.	Geog. and Geol. of Minn.	2	3	Jr., Sr.	Course 1
6.	Historical Geol.	2	3	Jr., Sr.	Courses 1 and 7, or 8
7.	Elements of Paleontol...	1	3	Jr., Sr.	See statement
8.	Paleontology	1, 2	6	Jr., Sr.	See statement
9.	Paleontologic Practice..	1, 2	6	Jr., Sr.	See statement
10.	Elements of Rock Study	1	3	Jr., Sr.	Course 1
11.	Petrography	2	3	Jr., Sr.	Course 10
12.	Applied Geol.	1	3	Jr., Sr.	Course 1
13.	Ore Deposits	1	3	Sr.	Course 1
14.	Special Problems	2	2	Sr.	Geol. 1 and Min. 1
15.	Method and Material of Geog.	1, 2	2	Jr., Sr.	Course 1 or 13
16.	Outline Study of Minerals and Rocks.....	1, 2	2	Sr.	None
17.	Field and Lab. Practice.	1, 2	2	Jr., Sr.	None
18.	Petrographical Problems	1, 2	..	Grad.	See statement
19.	Keweenawan Eruptions.	1, 2	..	Grad.	See statement
20.	Glacial Geol.	1, 2	..	Grad.	See statement
21.	Paleontologic Geol. ....	..	3	Grad.	Courses 1, 6 and 8
22.	Advanced Paleontology.	1, 2	6	Grad.	Course 8

MINERALOGY

1.	Elements of Min.	1	3	Soph., Jr., Sr.	None
2.	Descriptive Min.	1, 2	6	Soph., Jr., Sr.	None
3.	Quantitative Min.	2	3	Soph., Jr., Sr.	Course 1
4.	Optical Min.	2	3	Sr.	Course 1
5.	Morphology of Minerals.	1	3	Jr., Sr.	
6.	Physico-Chem. Methods.	2	3	Sr.	
7.	Outline of Min.	1, 2	2	Jr., Sr.	None
8.	Original Problems	1, 2	..	Grad.	See statement
9.	Special Investigations ..	..	..	Grad.	See statement
10.	Occurrences and Association	1, 2	..	Grad.	See statement

GEOLOGY

1. GENERAL GEOLOGY

Three credits (three hours per week)

Open to juniors and seniors.

Comprises: (1) geodynamics, in which are set forth the phenomena of the atmosphere, water, heat, gravity, and plants and animals as geologic agents; (2) structural geology, wherein stratification, displacement and veining of rock masses are described; (3) physiographic geology, pointing out prominent earth features and inquiring into the causes producing them; (4) an outline of historical geology. Conferences and lectures illustrated by photographs, maps, profiles, and lantern slides.
- PROFESSOR HALL
- First semester

2. **ESSENTIALS OF PHYSICAL GEOGRAPHY** ASSISTANT PROFESSOR LEHNERTS
 Three credits (three hours per week) First semester
 Open to juniors and seniors.
 Discussion of the principles of earth sculpture and description of the structural features of continents, with special reference to the ethnic movements and commercial activities of mankind.
3. **INDUSTRIAL GEOGRAPHY** ASSISTANT PROFESSOR LEHNERTS
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 1 or 2.
 The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and dominating climatic characters of the several agricultural regions of the continent; a discussion of the geography of industries as they have grown up within the past 100 years and their dependence upon physiographic conditions; a study of local industries effected through excursions and reports. A brief survey of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.
4. **ELEMENTS OF METEOROLOGY** ASSISTANT PROFESSOR LEHNERTS
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 1 or 2.
 The general principles of meteorology are treated, embracing the properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally. The conditions of climatic changes are studied and the influence of physiographic conditions are discussed. Text-book, lectures, and reference reading.
5. **GEOGRAPHY AND GEOLOGY OF MINNESOTA** PROFESSOR HALL
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 1.
 (a) The physical geography of the state in its relations to geological history and industrial development. (b) A study of the principles and facts of pre-Cambrian geology as exemplified within the state and the extension of these into general application. (c) The present problems of the state in agriculture, drainage, water power, mining, quarrying, etc., are considered in some detail.
6. **HISTORICAL GEOLOGY** ASSISTANT PROFESSOR SARDESON
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 1, 7 or 8.
 A course in historical geology, including a study of the more important types of fossils in their geological relations. The history of the North American continent in particular is considered. Lectures and demonstrations.
7. **ELEMENTS OF PALEONTOLOGY** ASSISTANT PROFESSOR SARDESON
 Three credits (three hours per week) First semester
 Open to juniors and seniors who have taken or are taking courses in geology or biology.
 This course includes an elementary study of fossil organisms and a discussion of the sources and interpretation of paleontologic evidence and the relation to it of theories of evolution. Lectures and demonstrations. Occasional excursions will be arranged.
8. **PALEONTOLOGY** ASSISTANT PROFESSOR SARDESON
 Six credits (three hours per week) Both semesters
 Open to juniors and seniors who have taken or are taking courses in geology or biology.
 The chief types of organisms as represented by fossils will be studied successively. The leading fossils and their phylogenetic history will be treated with considerable detail. Lectures and demonstrations.
9. **PALEONTOLOGIC PRACTICE** ASSISTANT PROFESSOR SARDESON
 Six credits (three hours per week) Both semesters
 Open to juniors and seniors who have completed course 8; may be taken by students pursuing courses in geology and biology in conjunction with course 7.
 The collection, preparation, and study of materials, examination of collections, and reading will be carried on with a view to more complete knowledge of the groups of fossil organisms as presented in course 7.

10. ELEMENTS OF ROCK STUDY**MR. GROUT**

Three credits (three hours per week)

First semester

Open to juniors and seniors who have completed course 1.

The structures, textures, and mineral and chemical composition of rocks. A practical study of rock types with laboratory and field practice. The origin, occurrence, variation, and alteration of rocks are considered with a view to their accurate description. An introduction to the use of the microscope concludes the course. Kemp's *Handbook of Rocks*, reference reading, and practice.

11. PETROGRAPHY**MR. GROUT**

Three credits (three hours per week)

Second semester

Open to juniors and seniors who have completed course 10.

The identification of rocks through the optical study of the component minerals; rock structures as seen under the microscope; alterations of rocks, and stratigraphic relations are studied. Preparation of material for study, its collection in the field, and an examination of some group of Minnesota crystalline rocks are features of the course. Laboratory, lectures, reference reading, and field work.

12. APPLIED GEOLOGY**MR. GROUT**

Three credits (three hours per week)

First semester

Open to juniors and seniors who have completed course 1.

An outline of the economic relations of geology. The course comprises a discussion of the nature and distribution of non-metallic materials of economic value, including coal, mineral oil, and natural gas; phosphates and other natural fertilizers; soils; the geologic conditions of water supply; abrasive and fictile materials; natural and artificial building stones; mortars and cements; road-making materials; followed by a brief summary of the nature and distribution of ore deposits. Text-book and reference reading.

13. ORE DEPOSITS**PROFESSOR HALL**

Three credits (three hours per week)

First semester

Open to seniors who have completed geology 1 and mineralogy 1.

History of mineral discovery and development in the Americas; a discussion of the origin and distribution of ore deposits, embracing the chemical processes involved in their formation and subsequent alterations; a description of the geology and mineralogy of ore bodies, particularly those yielding gold, silver, copper, iron, lead, and zinc.

14. SPECIAL PROBLEMS**PROFESSOR HALL**

Two credits (two hours per week)

Second semester

Open to seniors who have completed course 1 or 13.

The investigation by individual students of particular problems, involving the field work of an investigation of some particular formation and the laboratory investigation and reading incident to the study of the material collected. The methods of systematically recording and interpreting geological and mineralogical data as observed in the field, the keeping of note-books, and the preparation of geological maps, profiles, and sections will be taught.

15. THE METHOD AND MATERIAL OF GEOGRAPHY**ASSISTANT PROFESSOR LEHNERTS**

Two credits (one hour per week)

Both semesters

Open to juniors and seniors; designed specially for teachers.

The earth as an object of study in the grades and in the high school; guiding principles; the course of study; text-books and their use; practical laboratory work; excursions; collection and preparation of illustrative materials; map drawing, chalk modeling, and relief work; organization of geographical subject matter for class-room instruction; and the method of the recitation.

16. OUTLINE STUDY OF MINERALS AND ROCKS**PROFESSOR HALL AND MR. GROUT**

Two credits (one hour per week)

Both semesters

Open to seniors; designed specially for teachers.

This course treats of the leading physiographic facts and principles; the macroscopic characters of the common rocks and a discussion of the general principles of petrographical and stratigraphical geology. Lectures and reading, supplemented by excursions and practical problems.

17. FIELD AND LABORATORY PRACTICE

PROFESSOR HALL AND
ASSISTANT PROFESSOR LEHNERTS
Both semesters

Two credits (one hour per week)

Open to juniors and seniors; designed specially for teachers.

A study of the geography and geology of Minneapolis, St. Paul, and adjacent territory, embracing the salient physiographic, stratigraphic, and economic features of this interesting region. Relief, topography, and map work will receive attention in the laboratory as well as in the field. For teachers and others who wish to learn the methods of field geography and geology.

18. PETROGRAPHICAL PROBLEMS

PROFESSOR HALL AND MR. GROUT
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

A study of rocks as geological bodies; the genesis of rocks and their chemical and dynamical alterations, illustrated in the gneisses and gabbroschists of the Minnesota river valley or the granites and basic eruptives of central Minnesota.

19. THE KEWEENAWAN ERUPTIVES

PROFESSOR HALL AND MR. GROUT
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

This course treats first, eastern and northwestern Minnesota, their stratigraphic relations, textural and structural characters; second, other problem in the Keweenawan to be selected on consultation.

20. GLACIAL GEOLOGY

PROFESSOR HALL
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

The local features of glacial phenomena. Field work will form the special feature of this course, embracing the formations at Minneapolis or some area accessible from it, as a survey of the glacial lakes in the vicinity, the gorge of the Falls of Saint Anthony, the Dalles of the Saint Croix, and other problems. The special field to be selected on consultation.

21. PALEONTOLOGIC GEOLOGY

ASSISTANT PROFESSOR SARDESON

Three credits (three hours per week)

Open to graduate students who have completed courses 1, 6, and 8.

A study of the Ordovician fauna with special illustrations from the Ordovician of Minnesota and neighboring states.

22. ADVANCED PALEONTOLOGY

ASSISTANT PROFESSOR SARDESON

Six credits (three hours per week)

Both semesters

Open to graduate students who have completed course 8.

The study of a selected group of fossils; a practical acquaintance with the forms and literature of the group is sought. The class work is to be supplemented by a thesis.

MINERALOGY

1. ELEMENTS OF MINERALOGY

PROFESSOR HALL AND MR. GROUT

Three credits (six hours per week)

First semester

Open to sophomores, juniors, and seniors; the laboratory fee is three dollars.

(a) The morphology of minerals; the physical and chemical characters of minerals, with demonstrations; a study of the native elements and of economic minerals; the basis of classification. (b) Laboratory work; this consists of practice in the recognition of crystal forms, tests illustrating the range of minerals, and the application of chemical and blowpipe analysis to the identification of species.

2. DESCRIPTIVE MINERALOGY

PROFESSOR HALL AND MR. GROUT

Three credits (six hours per week)

Second semester

Open to sophomores, juniors, and seniors; the laboratory fee is three dollars.

(a) A study of the rock-forming minerals; the projection and construction of figures of crystals; the calculation of crystal-axes. Theses.

3. **QUANTITATIVE MINERALOGY** PROFESSOR APPLEBY AND ASSISTANT PROFESSOR CHRISTIANSON
 (In the School of Mines)
 Three credits (six hours per week) Second semester
 Open to sophomores, juniors, and seniors, who have completed course 1; the laboratory fee is five dollars.
 Determination of the value of ores. Lectures, recitations, and laboratory work. Identical with metallurgy 1 in the School of Mines.
4. **OPTICAL MINERALOGY** MR. GROUT
 Three credits (six hours per week) Second semester
 Open to juniors and seniors who have completed course 1.
 A study of the microscopic structure of crystals and crystal grains. An application of methods used in determining minerals by their optical properties; goniometric and stauroscopic practice, embracing the elements of lithology. Lectures and laboratory work.
5. **THE MORPHOLOGY OF MINERALS** MR. GROUT
 Three credits (three hours per week) First semester
 Open to juniors and seniors.
 A study of crystallography, embracing projection and the geometric relations of crystal planes. The identification of minerals from crystal measurement and mathematical calculation. Crystal nomenclature.
6. **PHYSICO-CHEMICAL METHODS WITH THEIR APPLICATIONS**
 Three credits (three hours per week) Second semester
 Open to seniors.
 The method of micro-chemical analysis described and demonstrated; the leading elements found in minerals are determined through the aid of crystalline precipitates of known compounds. Special attention is given to the study and determination of the rock-making minerals.
7. **AN OUTLINE OF MINERALOGY** MR. GROUT
 Two credits (one hour per week) Both semesters
 Open to juniors and seniors.
 A study of methods of identification of minerals, with their applications. Conferences, reading, and demonstrations.
8. **ORIGINAL PROBLEMS IN MORPHOLOGICAL AND PHYSICAL MINERALOGY** PROFESSOR HALL AND MR. GROUT
 Both semesters
 Open to graduate students; other arrangements may be ascertained upon application to the department.
 Investigations in mathematical crystallography and its application to crystal development and structure. Further applications than are made in course 4 of the optical characters of minerals in identification of mineral species.
9. **SPECIAL INVESTIGATIONS IN CHEMICAL AND PHYSICAL MINERALOGY** MR. GROUT
 Open to graduate students; other arrangements may be ascertained upon application to the department.
 Special attention is here given to tenacity and electrical properties and their relation to crystal form, cleavage, and fracture. Dimorphous compounds are investigated and the conditions governing their formation studied. The physical properties of artificial mineral compounds are compared with those of natural minerals.
10. **MINERAL OCCURRENCES AND ASSOCIATION** PROFESSOR HALL AND MR. GROUT
 Both semesters
 Open to graduate students; other arrangements may be ascertained upon application to the department.
 A discussion of genetic relationships. Field work in connection with the different phases of the particular problem in hand.

PHYSICS

The requirement for a major in physics is the completion of eighteen credits from the courses offered by the department; for a minor, twelve credits. For distinction in physics the special requirements of the department are the completion of courses 5, 6, and 7, and three other courses selected from those open to juniors and seniors, together with mathematics 6 and 7;

work in the department must be pursued during the senior year. To obtain the recommendation of the department for a teacher's certificate courses 1 to 4 inclusive, 20, four other credits in physics, and six credits in chemistry, or courses 5, 6, 20, and six credits in chemistry, must be completed.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Gen. Physics	1	3	Soph., Jr., Sr.	Math. 4
2.	Gen. Lab. Practice.....	1	1	Soph., Jr., Sr.	See statement
3.	Gen. Physics	2	3	Soph., Jr., Sr.	Course 1
4.	Gen. Lab. Practice.....	2	1	Soph., Jr., Sr.	See statement
5.	Adv. Gen. Physics.....	1	6	Soph., Jr., Sr.	Math. 4
6.	Adv. Gen. Physics.....	2	6	Soph., Jr., Sr.	Course 5
7.	Electrical Measurements	1	3	Jr., Sr.	Courses 5 and 6
8.	Physical Manip. and Lab. Technique	2	3	Jr., Sr.	Courses 5 and 6
9.	Dynamics	1	3	Jr., Sr.	Courses 5 and 6, and Math. 6 and 7
10.	Adv. Physical Measurements	1	3	Sr. Grad.	Courses 5 and 6
11.	Adv. Physical Measurements	1	6	Sr. Grad.	Courses 5 and 6
12.	Theory of Light	2	3	Grad.	Courses 5 and 6, and Math. 6 and 7
13.	Elect. Meas. of Precision	2	3	Sr.	Course 7
14.	Radioactivity	1, 2	6	Grad.	Courses 5 and 6
15.	Adv. Phys. Measurements	2	3	Grad.	Courses 5 and 6
16.	Adv. Phys. Measurements	2	6	Sr. Grad.	Courses 5 and 6
17.	Kinetic Theory of Gases	2	3	Grad.	Courses 5 and 6 Math. 6 and 7
18.	Discharge of Elect. thru Gases	1	3	Grad.	Courses 5 and 6, and Math. 6 and 7
19.	Math Theory of Elect. and Magnetism	2	3	Grad.	Courses 5 and 6, and Math. 6 and 7
20.	Teachers' Course	2	1	Sr.	Courses 1-4 incl., or 5 and 6

1. GENERAL PHYSICS

PROFESSOR JOHN ZELFNY

Three credits (three hours per week)

First semester

Open to sophomores, juniors, and seniors; may be taken separately or in conjunction with course 2.

Mechanics of solids and fluids, heat and sound. This is the first part of a general course in physics. The treatment is experimental rather than mathematical. The course is designed to give the student a general knowledge of the fundamental principles of the subject and will be found specially useful to those pursuing other sciences. There will be one experimental lecture and two recitations each week.

2. GENERAL LABORATORY PRACTICE

MR. KOVARIK

One credit (two hours per week)

First semester

Open to sophomores, juniors, and seniors, who have completed or are taking course 1; the laboratory fee is three dollars.

Physical measurements in the mechanics of solids and fluids, and in heat and sound, giving the student a knowledge of experimental methods.

3. GENERAL PHYSICS

PROFESSOR JOHN ZELENY

Three credits (three hours per week)

Second semester

Open to sophomores, juniors, and seniors, who have completed course 1; may be taken separately or in conjunction with course 4.

Light, electricity, and magnetism. This is the second part of a general course in physics. The treatment is experimental and the fundamental principles of the subjects, including those of radioactivity, ionization, X radiation, and the electrical constitution of matter, are discussed and illustrated. There will be one experimental lecture and two recitations each week.

4. **GENERAL LABORATORY PRACTICE** MR. KOVARIK
 One credit (two hours per week) Second semester
 Open to sophomores, juniors, and seniors, who have completed or are taking course 2; the laboratory fee is three dollars.
 Physical measurements in light, electricity, and magnetism, giving the student a knowledge of experimental methods.
5. **ADVANCED GENERAL PHYSICS** PROFESSOR JONES, ASSISTANT
PROFESSORS ANTHONY ZELENY, AND ERIKSON
 Six credits (seven hours per week) First semester
 Open to sophomores, juniors, and seniors, who have completed mathematics 4 (trigonometry); the laboratory fee is three dollars; adapted to those students who expect to specialize in physics, to teach the science, or to enter upon a technical course.
 Mechanics of solids and fluids, the properties of matter, heat, and sound. This course is intended to give a thorough training in general physics and includes the solution of numerous problems. There will be two lectures, three recitations, and one laboratory (double) period each week.
6. **ADVANCED GENERAL PHYSICS** PROFESSOR JONES, ASSISTANT
PROFESSORS ANTHONY ZELENY, AND ERIKSON
 Six credits (seven hours per week) Second semester
 Open to sophomores, juniors, and seniors, who have completed course 5; the laboratory fee is three dollars; intended for those students who wish to specialize in the science, to teach the subject, or to enter upon a technical course.
 Light, electricity, and magnetism. This course completes the work in general physics. There will be two experimental lectures, three recitations, and one (double) laboratory period each week.
7. **ELECTRICAL MEASUREMENTS** ASSISTANT PROFESSOR ANTHONY ZELENY
 Three credits (five hours per week) First semester
 Open to juniors and seniors who have completed courses 5 and 6; the laboratory fee is five dollars.
 The course aims to give a thorough practical knowledge of electrical instruments and the fundamental electrical measurements. The system of electrical units is developed theoretically and experimentally. There will be two (double) laboratory periods each week, the class being divided into sections for that purpose.
8. **PHYSICAL MANIPULATION AND LABORATORY TECHNIQUE** PROFESSOR JOHN ZELENY
 Three credits (six hours per week) Second semester
 Open to juniors and seniors who have completed courses 5 and 6; the laboratory fee is three dollars; especially valuable to those who intend to teach the science or to specialize in it.
 The object of this course is to give the student a knowledge of the essential physical manipulations (such as the cleaning and distilling of mercury, soldering, glass blowing, glass cutting, glass grinding, making of quartz fibers, etc.), and to acquaint him with the use of some instruments of precision (such as the cathetometer, the dividing engine, the balance, mercury air pumps and gauges, etc.)
9. **DYNAMICS** PROFESSOR JONES
 Three credits (three hours per week) First semester
 Open to juniors and seniors who have completed courses 5 and 6, and mathematics 6 and 7 (calculus).
 A discussion of some problems in dynamics which are important in the study of advanced physics.
10. **ADVANCED PHYSICAL MEASUREMENTS** PROFESSOR JOHN ZELENY
 Three credits (six hours per week) First semester
 Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is three dollars.
 The course consists of individual work in the laboratory on topics specially chosen to serve best the needs and capacity of each student. The course is intended to introduce the student to some of the more intricate physical measurements and to teach him self-reliance.

11. **ADVANCED PHYSICAL MEASUREMENTS** PROFESSOR JOHN ZELENY
Six credits (twelve hours per week) First semester
Open to seniors and graduate students who have completed
courses 5 and 6; the laboratory fee is five dollars.
The same as course 10 except that twice as much time is devoted to the
subject.
12. **THE THEORY OF LIGHT** PROFESSOR JONES
Three credits (three hours per week) Second semester
Open to graduate students who have completed courses 5 and 6,
and mathematics 6 and 7 (calculus).
A study of the important optical phenomena. Preston's *Theory of Light*
is used as a text.
13. **ELECTRICAL MEASUREMENTS OF PRECISION** ASSISTANT PROFESSOR
ANTHONY ZELENY
Three credits (six hours per week) Second semester
Open to seniors who have completed course 7; the laboratory fee
is three dollars; intended for electrical engineering and scien-
tific students who desire to specialize in electrical work of the
highest precision.
The course is chiefly experimental and includes the following: making
of standard cells; calibration of Wheatstone box bridge; adjustment of
resistances, ammeters, and voltmeters; use of the potentiometer in measure-
ments of highest precision; experimental problems involving capacity, in-
ductance, and magnetic flux; measurement of temperatures by electrical
methods.
14. **RADIO-ACTIVITY** MR. KOVARIK
Six credits (three hours per week) Both semesters
Open to graduate students who have completed courses 5 and 6.
The course consists entirely of lectures, experimental and descriptive.
The various theories and the methods of investigation are fully considered.
15. **ADVANCED PHYSICAL MEASUREMENTS** PROFESSOR JOHN ZELENY
Three credits (six hours per week) Second semester
Open to seniors and graduate students who have completed
courses 5 and 6; the laboratory fee is three dollars.
The course is the experimental study of some physical phenomena, the
nature or laws of which are not yet understood.
16. **ADVANCED PHYSICAL MEASUREMENTS** PROFESSOR JOHN ZELENY
Six credits (twelve hours per week) Second semester
Open to seniors and graduate students who have completed
courses 5 and 6; the laboratory fee is five dollars.
The same as course 5; except that twice as much time is devoted to the
subject.
17. **THE KINETIC THEORY OF GASES** ASSISTANT PROFESSOR ERIKSON
Three credits (three hours per week) Second semester
Open to graduate students who have completed courses 5 and 6,
and mathematics 6 and 7 (calculus).
This course is a study of Meyer's *Kinetic Theory of Gases*.
18. **DISCHARGE OF ELECTRICITY THROUGH GASES** PROFESSOR JOHN ZELENY
Three credits (three hours per week) First semester
Open to graduate students who have completed courses 5 and 6,
and mathematics 6 and 7 (calculus).
The course consists of lectures, with experimental illustrations, on the
conduction of electricity through gases. A study is made of the conductivity
imparted to gases by the action of X rays, ultra-violet light, radioactive
substances, and glowing metals; of the discharge of electricity from points
and in vacuum tubes; and of the spark and arc discharges. The methods of
measuring the velocity of the ions and the charges carried by them are
studied in detail.
19. **THE MATHEMATICAL THEORY OF ELECTRICITY AND MAGNETISM** PROFESSOR JOHN ZELENY
Three credits (three hours per week) Second semester
Open to graduate students who have completed courses 5 and 6,
and mathematics 6 and 7 (calculus).
This course consists in the study of J. J. Thomson's *Elements of the
Mathematical Theory of Electricity and Magnetism*.

20. TEACHERS' COURSE

One credit (one hour per week)

Open to seniors who have completed courses 1 to 4 or courses 5 and 6.

No subject matter is discussed, but methods of presentation and the selection of lecture and laboratory experiments are considered. The work is conducted by the students under the direct supervision of the instructor.
- PROFESSOR JONES
- Second semester

VI. Pure and Applied Mathematics

MATHEMATICS

The requirement for a minor in mathematics is the completion of courses 3, 4, 5 and 6; for a major, the same courses and in addition course 7 and three other credits. For distinction in mathematics the special requirement of the department is one year of pure mathematics in addition to the requirements for a major. To obtain the recommendation of the department for a teacher's certificate an average of at least *good* must be obtained in courses 3, 4, 5, 6, and 8 or 9.

MATHEMATICS

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Higher Alg. Part I.	1	5	Fresh.	See statement
2.	Solid Geom.	2	5	Fresh.	See statement
3.	Higher Alg. Part II. ...	1	3	Fresh.	See statement
4.	Trigonometry	2	3	Fresh.	See statement
5.	Analyt. Geom.	1	3	Soph., Jr., Sr.	Courses 3 and 4
6.	Differential Calculus...	2	3	Soph., Jr., Sr.	Courses 3, 4 and 5
7.	Integral Calculus	1	3	Jr., Sr.	Courses 3, 4, 5 and 6
8.	Adv. Algebra	1	3	Soph., Jr., Sr.	Courses 3 and 4
9.	Theory of Equations ...	2	3	Soph., Jr., Sr.	Courses 3, 4 and 8
10.	Differential Equations..	2	3	Jr., Sr.	Courses 3-7 incl.
11.	Adv. Plane Anal. Geom.	1	3	Jr., Sr.	Courses 3-6 incl.
12.	Solid Anal. Geom.	2	3	Jr., Sr.	Courses 3-8 incl.
13.	Math. Pedagogy	2	1		Courses 3 and 4
14.	Method of Least Squares	2	2	Jr., Sr.	Courses 3-7 incl.
15.	Descriptive Geom.	1, 2	4*	Jr., Sr.	Courses 3, 4 and 5
16.	Adv. Diff. and Int. Cal..	1, 2	4	Grad.	Courses 3 to 7 incl.
17.	Theory of Curves and Surfaces	1, 2	4	Grad.	Courses 3-7 incl. and 10 and 12
18.	Galois Theory of Equations	1, 2	4	Grad.	Courses 3-9 incl.
19.	Functions of a Complex Variable	1, 2	4	Grad.	Courses 1-10 incl.
20.	Projective Geom.	1, 2	4	Grad.	Courses 3-7 incl., and 11 and 12
21.	Elliptic Integrals	1, 2	4	Grad.	Courses 3-7 incl., and 10

MECHANICS

1. Applied Mechanics
- 1, 2
- 10
- Sr.
- Math. 3-7 incl.

*Both semesters must be completed before credit is given for the first semester.

1. FIRST PART OF HIGHER ALGEBRA
- Five credits (five hours per week)
- Required of freshmen who do not have an entrance credit in the subject; must be followed by course 3; not open to those who have taken the subject in the preparatory school; not credited toward a minor in mathematics.
- MESSRS MANCHESTER AND SHUMWAY
- First semester
- The fundamental rules, factoring, highest common divisor, lowest common multiple, fractions, involution, evolution, surds, imaginaries, simple equations

with one, two or more unknown quantities, ratio, proportion, problems.

The examples and problems are more difficult than those under the same subjects in elementary algebra and demonstrations are an important part of the work.

2. **SOLID GEOMETRY** MESSRS. MANCHESTER AND SHUMWAY
 Five credits (five hours per week) Second semester
 Required of freshmen who have no entrance credit in the subject;
 not open to those who have taken the subject in the preparatory school; not credited toward a minor in mathematics; not to be offered after 1907-8.
 Demonstrations, exercises, and problems.

3. **SECOND PART OF HIGHER ALGEBRA** PROFESSOR BAUER, ASSISTANT PROFESSOR BUSSEY, MESSRS. DALAKER, MANCHESTER AND SHUMWAY
 Three credits (three hours per week) First semester
 Open to those who have completed course 1; required of all freshmen.

Variation, quadratic equations, special higher equations, simultaneous equations of the second degree, maxima and minima of algebraic functions, differentiation of algebraic functions, development of functions, logarithms, theory of equations and solution of numerical higher equations.

4. **TRIGONOMETRY** PROFESSOR BAUER, ASSISTANT PROFESSOR BUSSEY, MESSRS. DALAKER, MANCHESTER, AND SHUMWAY
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 1 and 3, and required of freshmen who take course 3.
 Text, tables, and numerous problems.

5. **ANALYTICAL GEOMETRY** PROFESSOR DOWNEY, ASSISTANT PROFESSOR BUSSEY, MESSRS. DALAKER AND MANCHESTER
 Three credits (three hours per week) First semester
 Open to those who have completed courses 3 and 4; courses 8 and 9 can be taken in conjunction with this course and course 6, and this is recommended to students specializing in mathematics.

Rectilinear and polar co-ordinates, producing equations of loci whose law of development is known, constructing and discussing such equations, transformation of co-ordinates, properties of the straight line, the conic sections and higher plane curves by means of their equations.

6. **DIFFERENTIAL CALCULUS** PROFESSOR DOWNEY, ASSISTANT PROFESSOR BUSSEY, MESSRS. DALAKER AND MANCHESTER
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 3 to 5 inclusive.

Differentiation of algebraic and transcendental functions, development of functions, indeterminate forms, maxima and minima, treatment of tangents, subtangents, normals, subnormals, asymptotes, direction and rate of curvature, evolutes, envelopes, and singular points.

7. **INTEGRAL CALCULUS** PROFESSOR DOWNEY
 Three credits (three hours per week) First semester
 Open to those who have completed courses 3 to 6 inclusive.

Integration of the various forms, integration as summation, rectification of curves, quadrature of plane and curved surfaces, cubature of volumes, equations of loci by means of the calculus, successive integration with applications to moment of inertia, areas and volume.

8. **ADVANCED COURSE IN ALGEBRA** MESSRS. DALAKER AND SHUMWAY
 Three credits (three hours per week) First semester
 Open to those who have completed courses 3 and 4; may be taken in conjunction with course 5.

Indeterminate equations, Sturm's theorem and method, recurring equations, series with applications to interpolation and piles of spheres, permutations and combinations, determinants.

9. **THEORY OF EQUATIONS** MR. SHUMWAY
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 3, 4, and 8; may be taken in conjunction with course 6.
 Based on the texts of Cojori and Burnside and Pantan.

10. DIFFERENTIAL EQUATIONS PROFESSOR DOWNEY
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 3 to 7 inclusive.
 Text and lectures.
11. ADVANCED COURSE IN PLANE ANALYTICAL GEOMETRY PROFESSOR BAUER
 Three credits (three hours per week) First semester
 Open to those who have completed courses 3 to 6 inclusive.
 Supplementary to course 5, treating more fully some of the subjects of that course and taking up additional subjects.
12. SOLID ANALYTICAL GEOMETRY PROFESSOR BAUER
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 3 to 8 inclusive.
 A lecture course. Elementary theorems of projection, co-ordinates, the plane, the line in space, quadric surfaces, transformation of co-ordinates, tangents, poles and polars, the general equation of the second degree. Numerous examples are assigned to illustrate the theory.
13. MATHEMATICAL PEDAGOGY PROFESSOR BAUER
 One credit (one hour per week) Second semester
 Open to those who have completed courses 3 and 4.
 A lecture course, in which special attention is paid to the fundamental principles of algebra and geometry.
14. METHOD OF LEAST SQUARES PROFESSOR LEAVENWORTH
 Two credits (two hours per week) Second semester
 Open to those who have completed courses 3 to 7 inclusive.
 A study of the combination and adjustment of observations and the discussion of their precision as applied especially to engineering, physics, and astronomy.
15. DESCRIPTIVE GEOMETRY PROFESSOR KIRCHNER
 (In the College of Engineering)
 Four credits (two hours per week) Both semesters
 Open to those who have completed courses 3 to 5 inclusive;
 both semesters must be completed before credit is given for the first semester.
 Problems relating to points, lines, planes, solids, surfaces of revolution and warped surfaces; orthographic, isometric, horizontal, oblique, and perspective projections; shades and shadows. Recitations, lectures, and practice.
16. ADVANCED DIFFERENTIAL AND INTEGRAL CALCULUS PROFESSOR DOWNEY
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 7 inclusive.
 This course goes farther into some of the subjects treated in courses 6 and 7 and takes up some important subjects not included in those courses.
17. THEORY OF CURVES AND SURFACES PROFESSOR BAUER
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 7 inclusive and 10 and 12.
 This is a course in differential geometry. The fundamental equations of the theory of curves and of surfaces will be developed. The work will be based upon Scheffer's *Theorie der Curven* and *Flaechen*.
18. THE GALOIS THEORY OF EQUATIONS ASSISTANT PROFESSOR BUSSEY
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 9 inclusive.
19. THEORY OF FUNCTIONS OF A COMPLEX VARIABLE DR. MANCHESTER
OR MR. DALAKER
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 1 to 10 inclusive.
 Lectures, readings, and problems.
20. PROJECTIVE GEOMETRY ASSISTANT PROFESSOR BUSSEY
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 7 inclusive and courses 11 and 12.

21. ELLIPTIC INTEGRALS

ASSISTANT PROFESSOR BROOKE

(In the College of Engineering)

Four credits (two hours per week)

Both semesters

Open to graduate students who have completed courses 3 to 7 inclusive and course 10.

MECHANICS

1. APPLIED MECHANICS

PROFESSOR EDDY

(In the College of Engineering)

Ten credits (five hours per week)

Both semesters

Open to seniors who have completed mathematics 3 to 7 inclusive.

Recitations and lectures. Statics, dynamics, strength and elastic properties of the ordinary materials of construction, hydro-mechanics.

ASTRONOMY

ASTRONOMICAL OBSERVATORY

The students' astronomical observatory contains a ten and one-half-inch refracting telescope furnished with a third lens for converting it into a photographic telescope; a filar micrometer; a spectroscope by Brashear; a students' meridian circle and zenith telescope; a Repsold photographic measuring machine, a chronograph, and astronomical clocks.

The requirements for a major in astronomy are the completion of courses 1 and 2 (the latter as a six-hour course); for a minor, courses 1 and 2 (the latter as a three-hour course). For distinction in astronomy the special requirements of the department are the completion of courses 1 (taking in addition laboratory work with instruments three hours per week), 2 (as a six-hour course), and six credits in physics.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Gen. Astronomy	1, 2	6	Soph., Jr., Sr.	Math. 4
2.	Practical Astronomy ...	1, 2	6 or 12	Jr., Sr.	Course 1 and Math. 5, 6 and 7
3.	Adv. Practical Astronomy	1, 2	6	Grad.	Courses 1 and 2
4.	Celestial Mechanics	1, 2	6	Grad.	Courses 1 and 2
5.	Astrophotography	1, 2	6	Grad.	Courses 1 and 2

1. GENERAL ASTRONOMY

PROFESSOR LEAVENWORTH

Six credits (three hours per week)

Both semesters

Open to those who have completed mathematics 4 (trigonometry).

A study of the general principles of astronomy illustrated by lantern slides and telescopic observations.

2. PRACTICAL ASTRONOMY

PROFESSOR LEAVENWORTH

Six or twelve credits (three or six hours per week)

Both semesters

Open to juniors and seniors who have completed course 1 and mathematics 5, 6, and 7.

Theory and use of astronomical instruments in determining time, latitude, longitude, positions of heavenly bodies; astronomical photography, with measures of plates; study of the method of least squares.

3. ADVANCED PRACTICAL ASTRONOMY

PROFESSOR LEAVENWORTH

Six credits (three hours per week)

Both semesters

Open to graduate students who have completed courses 1 and 2.

4. CELESTIAL MECHANICS

PROFESSOR LEAVENWORTH

Six credits (three hours per week)

Both semesters

Open to graduate students who have completed courses 1 and 2.

5. ASTROPHOTOGRAPHY

PROFESSOR LEAVENWORTH

Both semesters

Open to graduate students who have completed courses 1 and 2.

Photography of the heavenly bodies, measurement of plates, determination of positions, parallax, etc.

VII. Philosophy, Education and Sociology

PHILOSOPHY AND PSYCHOLOGY

The requirement for a major in philosophy and psychology is the completion of eighteen credits from courses offered by the department; for a minor, twelve credits. For distinction in philosophy and psychology the special requirement of the department is the completion of twenty-four credits from the courses offered by the department, of which at least three must be intensive courses.

The courses offered by the department fall into three groups:

1. *Introductory courses*: 1 and 2. Course 1 is required for all advanced work in psychology, and either 1 or 2 for all work in philosophy, but students are advised to take both.
2. *General courses*: 3 to 12 inclusive.
3. *Advanced intensive courses*: 13 to 23 inclusive. These courses are open only to graduates and properly qualified seniors. All will not be offered each year but a selection will be made to meet the qualifications of the students presenting themselves.

The courses may also be grouped according to their purpose as follows:

1. Of special value for education: 1, 2, 3, and 11.
2. Fundamental courses in psychology: 1, 3, 4, 5, 8 and 14.
3. Fundamental courses in philosophy: 1, 2, 9, 10, 11 and 13.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Introductory Psych.	1	3	Soph., Jr., Sr.	None
2.	Logic	1 or 2	3	Soph., Jr., Sr.	None
3.	Educational Psych.	2	3	Soph., Jr., Sr.	Course 1
4.	Exp. Psych.: The Senses	1	3	Jr., Sr.	Course 1
5.	Exp. Psych.: Higher Mental Processes	2	3	Jr., Sr.	Courses 1 and 4
7.	Psychological Interpretation	1	3	Jr., Sr.	Course 1
8.	Psychological Principles	2	3	Jr., Sr.	Courses 1 and 2
9.	Ancient and Med. Philos	1	3	Jr., Sr.	Course 1 or 2
10.	Modern Philosophy	2	3	Jr., Sr.	Course 1 or 2
11.	Principles of Ethics	1	3	Jr., Sr.	Course 1 or 2
12.	Phil. of Religion	2	3	Jr., Sr.	Course 1 or 2
13.	Logic of Science	2	3	Jr., Sr.	Course 2
14.	Psychological Problems.	1, 2	..	Sr. Grad.	Courses 1, 4 and 5
15.	Research in Psych.	1, 2	6†	Grad.	Course 14
*16.	Descartes, Spinoza, Leibnitz	1, 2	6†	Sr. Grad.	Courses 9 and 10
*17.	Kant	1, 2	6†	Sr. Grad.	Courses 9 and 10
*18.	Hume	1, 2	6†	Sr. Grad.	Courses 9 and 10
19.	Herbert Spencer	2	3	Sr. Grad.	Courses 1 and 2
*20.	Metaphysics	1, 2	6†	Sr. Grad.	Courses 9 and 10, or 13
*21.	Systematic Ethics.....	1, 2	6†	Sr. Grad.	Courses 9, 10 and 11
*22.	Hist. of Ethics.....	1, 2	6†	Sr. Grad.	Courses 9, 10 and 11
*23.	German Idealism	1, 2	6†	Grad.	Courses 9, 10 and 17

†Both semesters must be completed before credit is given for the first semester.

*Open to students only upon approval of the department.

INTRODUCTORY COURSES

1. **INTRODUCTORY PSYCHOLOGY** PROFESSOR WILDE, ASSISTANT PROFESSORS MINER AND SWENSON, AND MR. HAYNES
 Three credits (three hours per week) First semester
 Open to sophomores, juniors, and seniors; required for all advanced work in psychology and for the teacher's certificate; it also serves as an introduction to the courses in philosophy.
 The purpose of the course is to acquaint the student with the general characteristics and laws of mental life and with the aims and methods of modern psychology. In connection with the work several lectures and

demonstrations on the nature of the nervous system will be given in the neurological laboratory of the College of Medicine and Surgery. Text-book, essays, and discussions.

2. LOGIC PROFESSOR WILDE, ASSISTANT PROFESSOR SWENSON,
AND MR. HAYNES
Three credits (three hours per week) Repeated each semester
Open to sophomores, juniors, and seniors.

A study of the nature, knowledge, and laws of reasoning, and the principles and methods of scientific proof. The aim of the course is to produce accuracy of thought as well as to familiarize the student with the logical grounds of modern science. Text-book, lectures, and reports.

GENERAL COURSES

3. EDUCATIONAL PSYCHOLOGY ASSISTANT PROFESSOR MINER AND MR. HAYNES
Three credits (three hours per week) Second semester
Open to those who have completed course 1.

The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

4. EXPERIMENTAL PSYCHOLOGY: The Senses ASSISTANT PROFESSOR MINER
AND MR. HAYNES
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed course 1. As

the number in each laboratory section will be limited, students must arrange with the instructor for their section before registration.

This course, together with course 5, is designed to give a general survey of experimental methods and results as well as a training for laboratory research in psychology. The work involves typical experiments on sensation and movement. One hour of class discussion and two double hour laboratory periods are required.

5. EXPERIMENTAL PSYCHOLOGY: Higher Mental Processes ASSISTANT PROFESSOR MINER
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed courses 1 and 4.

A continuation of course 4 with experiments on affection, memory, attention, and such other processes as can be studied by laboratory methods. The quantitative phase of experimental psychology is taken up for special discussion.

6. OUTLINE OF EXPERIMENTAL PSYCHOLOGY ASSISTANT PROFESSOR MINER
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed course 1; not given in 1908-9.

A study of the methods and accredited results of experimental investigation in psychology. Class-room demonstrations, lectures, and discussion.

7. PSYCHOLOGICAL INTERPRETATION ASSISTANT PROFESSOR MINER
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed course 1.

Unusual and pathological mental states are studied for the light they throw upon normal mental life. The student is given drill in the detecting of mental defects and in the psychological explanation of characters in history and literature. The subconscious, dreams, suggestibility, telepathy, nervous disorders, insanity, secondary personalities, and the crowd are among the topics treated.

8. PSYCHOLOGICAL PRINCIPLES ASSISTANT PROFESSOR SWENSON
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed courses 1 and 2.

An advanced course, treating in detail some of the more important theoretical problems connected with psychology. The discussions will center about the methods and aim of the science, its fundamental principles, and its relations to other sciences, regard being had to the general outlines of historical development in these respects.

9. **ANCIENT AND MEDIAEVAL PHILOSOPHY** PROFESSOR WILDE
 Three credits (three hours per week) First semester
 Open to juniors and seniors who have completed course 1 or course 2.

This and the following course are designed to give such an outline of the history of thought as is desirable in a general education. Emphasis is placed upon the human significance of philosophy rather than upon its purely technical aspect. In this first semester the main work will be upon the philosophies of Plato and Aristotle, but the later development will be traced as far as the Renaissance.

10. **MODERN PHILOSOPHY** PROFESSOR WILDE
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 1 or course 2.

Lectures on the representative systems of modern philosophy from the Renaissance to our own day, the purpose of the course being to prepare the student to understand the philosophical tendencies of the present. The work will include a study of Bacon, Descartes, Spinoza, Leibnitz, Locke, Berkeley, Hume, Kant, Mill, Schopenhauer.

11. **PRINCIPLES OF ETHICS** PROFESSOR WILDE
 Three credits (three hours per week) / First semester
 Open to juniors and seniors who have completed course 1 or course 2.

An introductory course, comprising a study of the distinction between moral and non-moral phenomena, an analysis of voluntary conduct, and a discussion of the nature of conscience, the meaning of right and wrong, the purpose of life, human responsibility, and the authority of moral law.

12. **PHILOSOPHY OF RELIGION** PROFESSOR WILDE
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 1 or course 2.

A study of the religious consciousness, its origin, development and significance; an analysis of the conception of God and a discussion of the place and function of religion in modern life.

ADVANCED INTENSIVE COURSES

13. **LOGIC OF SCIENCE** ASSISTANT PROFESSOR SWENSON
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 2.

This course serves as an introduction to philosophy through the medium of the special sciences, its aim being to suggest a system of the sciences through a discussion of the nature and relations of their fundamental principles.

14. **PSYCHOLOGICAL PROBLEMS** ASSISTANT PROFESSOR MINER
Both semesters
 Open to seniors and graduate students who have completed courses 1, 4, and 5; other arrangements may be ascertained upon application to the department.
 Original work or special topics.

15. **RESEARCH IN PSYCHOLOGY** ASSISTANT PROFESSOR MINER
 Six credits (three hours per week) Both semesters
 Open to graduate students who have completed course 14; both semesters must be taken before credit is given for the first semester.

Minor or major research in experimental, educational, analytic, genetic, or comparative psychology.

16. **THE PHILOSOPHY OF DESCARTES, SPINOZA, AND LEIBNITZ** ASSISTANT PROFESSOR SWENSON
 Six credits (three hours per week) Both semesters
 Open to seniors and graduates who have completed courses 1, 2, 9, and 10; both semesters must be completed before credit is given for the first semester.

A study of the pre-critical period of modern philosophy. The work will center in the discussion of the *Ethics* of Spinoza and *Monadology* of Leibnitz.

17. **THE PHILOSOPHY OF KANT** ASSISTANT PROFESSOR SWENSON
Six credits (three hours per week) Both semesters
Open to seniors and graduate students who have completed courses 1, 2, 9, and 10; both semesters must be completed before credit is given for the first semester.
A critical reading of the three Critiques; the relation of Kant to the development of modern philosophy.
18. **THE PHILOSOPHY OF HUME** ASSISTANT PROFESSOR SWENSON
Six credits (three hours per week) Both semesters
Open to seniors and graduates who have completed courses 1, 2, 9, and 10; both semesters must be completed before credit is given for the first semester.
A critical reading of Hume's philosophical works; the position of Hume in the development of English philosophy.
19. **THE PHILOSOPHY OF HERBERT SPENCER** ASSISTANT PROFESSOR SWENSON
Three credits (three hours per week) Second semester
Open to seniors and graduate students who have completed courses 1 and 2.
A critical reading of the *First Principles* with references to other important features of the *Synthetic Philosophy* and to the philosophical character of the modern scientific movement. The course is intensive, the aim being to develop the power of philosophical criticism in regard to such questions as the logical foundations of the theory of evolution, the relations of science and religion, and the place of the scientific interest among the other interests of life.
20. **METAPHYSICS** ASSISTANT PROFESSOR SWENSON
Six credits (three hours per week) Both semesters
Open to seniors and graduate students who have completed course 9 and course 10 or 11; both semesters must be completed before credit is given for the first semester.
A critical and constructive discussion of theories of knowledge and reality.
21. **SYSTEMATIC ETHICS** PROFESSOR WILDE
Six credits (three hours per week) Both semesters
Open to seniors and graduate students who have completed courses 9, 10, and 11; both semesters must be completed before credit is given for the first semester.
A detailed study of the principles of conduct and the basis of moral obligation.
22. **HISTORY OF ETHICS** PROFESSOR WILDE
Six credits (three hours per week) Both semesters
Open to seniors and graduate students who have completed courses 9, 10, and 11; both semesters must be completed before credit is given for the first semester.
A critical study of the development of Greek, English, and German ethical thought. Chief attention will be paid to the work of Plato and Aristotle in ancient times, and to the relation between utilitarianism and idealism in modern philosophy.
23. **GERMAN IDEALISM** PROFESSOR WILDE
Six credits (three hours per week) Both semesters
Open to graduate students who have completed courses 9, 10, and 17; both semesters must be completed before credit is given for the first semester; a knowledge of German is required.
A study of the development of German philosophy after Kant, especially as found in the writings of Fichte and Hegel.

EDUCATION

The requirement for a major in education is the completion of eighteen credits from courses offered by the department; for a minor, twelve credits.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Hist. of Educ. to Reformation	1	3	Jr., Sr.	None
2.	Hist. of Mod. Education	2	3	Jr., Sr.	Course 1
3.	Educational Psych.	2	3	Soph., Jr., Sr.	Philosophy 1
4.	Secondary Education ..	1	3	Jr., Sr.	Courses 1 and 2
5.	Prin. and Org. of El. Teaching	2	3	Sr.	Courses 1, 2 and Philosophy 1
6.	Prin. and Org. of Sec. Teaching	2	3	Jr., Sr.	Course 4
7.	Theory of Education ...	1	3	Jr., Sr.	Philosophy 1
8.	School Administration..	1	3	Sr.	Courses 1 and 2
9.	School Supervision	2	3	Sr.	See statement
10.	Comp. Study of Sch. System	2	3	Sr.	Courses 1 and 2
11.	Modern Educ. Theories.	2	3	Sr.	Courses 1 and 2, and Philosophy 1
12.	Current Prob. in Elem. Teaching	1	2	Sr. Grad.	Course 5
13.	Educational Classics ...	1	2	Sr.	Courses 1 and 2
14.	Current Prob. in Sec. Teaching	2	2	Sr. Grad.	Course 6
15.	Probl. in Sch. Administration	2	2	Sr. Grad.	Courses 1 and 2
16.	School Sanitation	1	2	Sr. Grad.	None
17.	Organization of Higher Education	2	1	Sr. Grad.	Courses 1 and 2

1. HISTORY OF EDUCATION TO THE REFORMATION ASSISTANT PROFESSOR SWIFT
Three credits (three hours per week) First semester
Open to juniors and seniors.

An introductory study in the history of education, conducted by means of lectures, assigned readings, discussions, and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigation, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions. Attention will be given especially to the schools of Greece and of Rome, the education of the early Christian centuries, the development of different types of schools in medieval times, the rise of the university, and of the humanistic schools of the Renaissance.

2. HISTORY OF MODERN EDUCATION ASSISTANT PROFESSOR SWIFT
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed course 1.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

3. EDUCATIONAL PSYCHOLOGY ASSISTANT PROFESSOR MINER AND MR. HAYNES
Three credits (three hours per week) Second semester
Open to sophomores and juniors who have completed philosophy 1.

Identical with philosophy 3. The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

4. SECONDARY EDUCATION

PROFESSOR JAMES

Three credits (three hours per week)

First semester

Open to seniors who have completed courses 1 and 2.

A study of secondary education in the United States, with such references to the secondary schools of other countries as will lead to a clearer understanding of the place and function of the high school, its curriculum, the problems of present-day importance, and the relation of the high school to other parts of the system of public instruction. The course will be conducted by lectures, reports, and discussions.

5. PRINCIPLES AND ORGANIZATION OF ELEMENTARY TEACHING

PROFESSOR RANKIN

Three credits (three hours per week)

First semester

Open to seniors who have completed courses 1 and 2 and philosophy 1.

This course includes a consideration of the course of study of the elementary school and of the best methods of instruction. It is conducted by means of lectures, assigned readings, discussions, and reports. It is planned for all students who expect to teach in the high school or to be principals or superintendents. No credit is given in this course to graduates of normal schools who have received one year's credit at the University.

6. PRINCIPLES AND ORGANIZATION OF SECONDARY TEACHING

PROFESSOR RANKIN

Three credits (three hours per week)

Second semester

Open to seniors who have completed courses 1 and 2, and who have completed course 4 or are pursuing course 10.

This course includes lectures on the general methods of secondary teaching, assigned readings, reports, and discussions. It is planned more particularly for those who expect to teach in high schools.

7. THE THEORY OF EDUCATION

PROFESSOR JAMES

Three credits (three hours per week)

First semester

Open to juniors and seniors who have completed philosophy 1.

An introductory course in educational theory, including a somewhat detailed study of the principles on which is based the present practice in teaching. No credit is given in this course to graduates of normal schools who have received one year's credit at the University.

8. SCHOOL ADMINISTRATION

PROFESSOR RANKIN

Three credits (three hours per week)

First semester

Open to seniors who have completed courses 1 and 2.

An introductory study of school administration, conducted by lectures, reports, and discussions; the organization of school systems, the work of school boards, superintendents, principals, and teachers. This course is planned for students without any teaching experience, who hope later to do work in supervision.

9. SCHOOL SUPERVISION

PROFESSOR RANKIN

Three credits (three hours per week)

Second semester

Open to seniors; intended only for students with experience in teaching; credit will not be given both for course 8 and for course 9.

An advanced course treating of the duties of principals and superintendents.

10. COMPARATIVE STUDY OF SCHOOL SYSTEMS

PROFESSOR JAMES

Three credits (three hours per week)

Second semester

Open to seniors who have completed courses 1 and 2.

This course deals with the school systems of Germany, France, England, and the United States, with special reference to principles and methods of administration. Elementary, secondary, and higher institutions are examined with emphasis varying in successive years. The course is conducted partly by lectures and partly by assigned readings, reports, and discussions.

11. MODERN EDUCATIONAL THEORIES

PROFESSOR JAMES

Three credits (three hours per week)

Second semester

Open to seniors who have completed courses 1 and 2, and philosophy 1.

An advanced course in educational theory, dealing particularly with the contributions of Rousseau, Froebel, and Herbart, special emphasis being laid upon one of these writers in each successive year.

12. **CURRENT PROBLEMS IN ELEMENTARY TEACHING** **PROFESSOR RANKIN**
 Two credits (two hours per week) **First semester**
 Open to seniors and graduate students who have completed course 5.

This is a seminar course, involving a general discussion of some current problems in elementary education, one or two of which are worked out practically by the student under the direction of the instructor through readings, the visiting of schools, and through class discussions.

13. **EDUCATIONAL CLASSICS** **PROFESSOR JAMES**
 Two credits (two hours per week) **First semester**
 Open to seniors who have completed courses 1 and 2, and to graduate students.

A seminar course for the reading of selected educational classics and for the detailed study of corresponding periods in educational history.

14. **CURRENT PROBLEMS IN SECONDARY TEACHING** **PROFESSOR RANKIN**
 Two credits (two hours per week) **Second semester**
 Open to seniors and graduate students who have completed course 6.

This is a seminar course for advanced students, preferably with teaching experience, who wish to pursue a theoretical and a practical study of some current problems in connection with secondary teaching. The course will be conducted by lectures, class discussions, readings, and by the visiting of schools.

15. **PROBLEMS IN SCHOOL ADMINISTRATION** **PROFESSOR JAMES**
 Two credits (two hours per week) **Second semester**
 Open to seniors and graduate students who have completed courses 1 and 2.

A research course for advanced students, preferably with teaching experience, who desire to take up the investigation of some question of educational administration. The course will be conducted by lectures, class discussions, assigned readings, and, when possible, by a study of actual school conditions falling within the proposed field.

16. **SCHOOL SANITATION** **PROFESSOR RANKIN**
 Two credits (two hours per week) **First semester**
 Open to seniors and graduate students.

This course will be conducted by text, by lectures, and by investigations into problems of school lighting, heating, ventilation, and other questions of school architecture and management connected with the physical well-being of the pupils.

17. **ORGANIZATION OF HIGHER EDUCATION** **PROFESSOR JAMES**
 One credit (one hour per week) **Second semester**
 Open to seniors and graduate students who have completed courses 1 and 2.

This course is intended for students who are interested in the general problems of educational administration and who look forward later to college teaching. It includes an historical sketch of the development of the American university, with discussions of modes of organization and administration, problems of departmental teaching, and questions of class instruction.

ANTHROPOLOGY

See sociology and anthropology, pp. 109-111.

VIII. Social Sciences

The departments of economics and political science, history, and sociology constitute a social science group. The subjects are intimately inter-related, and they are all of especial importance to students who intend to engage in law, business, public service at home or abroad, journalism, the work of charities and corrections, or to give instruction in one of the social sciences. Students who are interested in the work of any one of the departments of the social science group ought to be familiar at least with the elements of the subjects offered in the other departments. A student who takes his major in any one of them ought to have more than the elements of the others. To students who are interested in the work of these departments, but who do not care to elect their major before the end of the sophomore year, the departments unite in the following recommendations for the freshman and sophomore years:

GENERAL RECOMMENDATIONS

I. Freshman and Sophomore Years:

1. The student should take the elementary work of each department within the group as early as possible. Accordingly the following courses are recommended:

Freshman year: history 2 (English constitutional); sophomore year: history 5 (American); economics 1, first or second semester; political science 1, first or second semester.

2. The student is advised to take in these years his required minor in science from the departments of botany or animal biology, and his required minor in language from the French or German beginning courses, unless he has a reading knowledge of both these languages at entrance.

II. Junior and Senior Years:

Elective under the direction of adviser selected from the department in which the major subject is taken.

ECONOMICS AND POLITICAL SCIENCE

DEPARTMENT REQUIREMENTS

Students taking a major (eighteen credits) in the department will take it all in one line of work (either economics or political science); and in addition will take a minor in the other line of work represented in the department.

Students taking one minor (twelve credits) in the department will take it all in either economics or political science. They may, however, take two minors, one in each line of work.

Students desiring a recommendation for a teacher's certificate must complete either a major or a minor in the department, according to the foregoing definitions. All desiring a recommendation to teach business subjects must complete a major in economics. For distinction in economics or political science the special requirements of the department are the completion of at least twenty-four credits in the line chosen and a minor in the other. The thesis must be typewritten and shall be filed in the department in the department.

All students taking a major in the department must secure the approval of their official advisers for forty-eight credits. Of these, not less than six credits in the case of an ordinary major, and not less than twelve credits in the case of a degree with distinction, shall be taken in other departments of the social science group.

SUGGESTIONS TO STUDENTS

The work in economics and political science bears very directly on preparation for professional or business life and citizenship, no matter what occupation is finally chosen. But in order to aid students who have some idea as to their intended profession or calling to make a wise choice of courses, the following tabulated statement has been prepared.

Students intending to enter the law, for example, will find in the left-hand column the numbers of certain courses which are recommended to form a minor in economics; and in the next column, some additional courses which are suggested for those taking a major in economics. At the right, in like manner, are given the recommendations for a minor and a major in political science.

It should be noted: (1) that these recommendations are merely suggestive, not binding; (2) that more courses are sometimes recommended than suffice to make up a technical minor or major, with the understanding that the student will consult the instructors and choose those courses which interest him the most.

Economics 1 and political science 1 are not included in these recommendations, as they must in any case precede the advanced courses; nor is economics 4 included, as it is required of all taking a major in economics.

Students desiring merely a general acquaintance with economics or political science as part of a liberal education and as a preparation for citizenship are recommended to take the introductory courses and such others, amounting at least to a minor, as their interests may indicate.

ECONOMICS		In Preparation for	POLITICAL SCIENCE	
Courses advised for a minor.	Additional advised for a major		Courses advised for a minor	Additional advised for a major
6, 7, 11, 10, 27	5, 28, 8, 9, 24 or 30	Law	2, 3, 8, 15, 7	4, 5, 10, 9, 12, 14
3, 6, 7, 11, 10	29, 26, 27	Public Service	2, 3, 7, 15, 14, 9	8, 4, 5, 10, 12
2, 3, 12, 13, 29	5, 28, 8, 9	Consular and Diplomatic Service	2, 3, 5, 10, 14	4, 8, 12
5, 28, 6, 7, 11, 10	29, 30, 16, 26	Journalism	2, 3, 7, 8, 9, 10	4, 5, 12
8, 9, 11, 10	16, 19, 20, 22	Engineering or Railway Service	6, 7, 14, 15,	4, 8
2, 12, 13, 11, 16	19, 20, 22, 29	Chemistry or Manufactures	2, 3, 7, 14, 9	8, 12, 14
8, 9, 11, 16	2, 12, 13, 20	Mining	2, 3, 7, 15, 9	8, 12, 14
5, 28, 15, 29	19, 20, 25	Insurance or Banking	2, 3, 7, 14, 15	4, 8, 10, 12
2, 3, 5, 28, 12, 13	19, 20, 22, 25	General Business	2, 3, 7, 15, 9	8, 12, 15
2, 14, 23, 12, 13	8, 9, 5, 19, 20	Forestry or Agriculture	2, 3, 15, 14	9, 12, 8
2, 3, 5, 28, 30	19, 20, 22, 24	Teaching Business Subjects or American Government	2, 3, 7, 9, 15	4, 5, 12, 10, 8, 14
1, 3, 5, 18	6, 7, 11, 10	Medicine	2, 3, 7, 15, 9	8, 12, 15
3, 16, 17, 18	26, 27, 24 or 30	Charity Work or the Ministry	2, 3, 7, 8	9, 12, 15

ECONOMICS

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
INTRODUCTORY COURSES:					
1.	Elements of Economics	1 or 2	3	Soph., Jr., Sr.	None
2.	Economic Geography...	1	3	Soph., Jr., Sr.	None
3.	Indus. and Com. Hist...	1, 2	3	Soph., Jr., Sr.	None
GENERAL COURSES:					
4.	Advanced Economics...	2	3	Soph., Jr., Sr.	Course 1
5.	Money and Banking...	1 or 2	3	Soph., Jr., Sr.	Course 1
28.	Financ. Hist. of the U. S.	2	3	Soph., Jr., Sr.	Courses 1 and 5
6.	Public Finance	1	3	Soph., Jr., Sr.	Course 1
7.	Problems in Taxation...	2	3	Soph., Jr., Sr.	Course 6
8.	Econs. of Transportation and Communication..	2	3	Soph., Jr., Sr.	Courses 1, 2 or 3
9.	*Railway Economics...	1	3	Soph., Jr., Sr.	Course 8
11.	The Modern Bus. Corpo-ration	1	3	Soph., Jr., Sr.	Course 1
10.	Municipal Industries ...	2	3	Soph., Jr., Sr.	Course 1
12.	*Economics of Commerce	1	3	Soph., Jr., Sr.	Courses 1, 2 or 3
13.	*Econ. of Colonization..	2	3	Soph., Jr., Sr.	Courses 1, 2 or 3
26.	*Social Theories and Re-forms	1	3	Soph., Jr., Sr.	Course 1
27.	*The State in Relation to Industry	2	3	Soph., Jr., Sr.	Course 26
16.	Labor Problems, Part I.	1	3	Soph., Jr., Sr.	Course 1
17.	Labor Problems, Part II,	2	3	Soph., Jr., Sr.	Course 1
18.	Charities and Correc-tions	1 or 2	3	Soph., Jr., Sr.	Courses 1 or 3, or Soc. 1
BUSINESS COURSES:					
19.	The Principles of Ac-counting	1, 2	3	Soph., Jr., Sr.	Course 1
20.	The Elem. of Bus. Law.	2	3	Soph., Jr., Sr.	Course 1
22.	Business Organization...	2	3	Soph., Jr., Sr.	Course 1
23.	Economics of Forestry and Irrigation	1	3	Soph., Jr., Sr.	Course 1 or 2
14.	Economics of Agriculture	2	3	Soph., Jr., Sr.	Course 1 or 2
15.	Economics of Insurance.	1	3	Soph., Jr., Sr.	Course 1
25.	Economics of Investment and Speculation	2	3	Jr., Sr.	Course 5
ADVANCED AND GRADUATE COURSES:					
29.	*Theory and Practice of Statistics	1	2	Jr., Sr.	Six credits in Econ.
30.	*Hist. of Econ. Thought	1	2	Jr., Sr.	Six credits in Econ.
24.	*Scope and Methods of Economics	1	2	Jr., Sr.	Six credits in Econ.
21.	Seminar in Economics..	1, 2	3-6	Sr.	Twelve cred. in Ec.

*Starred courses are not given every year.

INTRODUCTORY COURSES

1.

ELEMENTS OF ECONOMICS

PROFESSOR ROBINSON, DR. PHELAN
AND MR. COULTER

Three credits (three hours per week)

Repeated each semester

Open to sophomores, juniors, and seniors; designed for those who desire a general knowledge of economics and as an introduction to the more advanced courses offered in the department. Re-quired of all taking the six year medical course.

A thorough course in the elements of economic theory, with special reference to present day economic and social problems. McVey's *Outline* and a text-book, supplemented by lectures and problems, with a weekly quiz.
2.

ECONOMIC GEOGRAPHY

PROFESSOR ROBINSON

Three credits (three hours per week)

First semester

Open to sophomores, juniors, and seniors.

A study of the economic basis of modern civilization. The course em-braces: (1) a brief survey of the history of commerce prior to the modern

period; (2) an analysis of the causes, both in nature and man, which control the development and the localization of industry and commerce; (3) a summary view of the development of transportation in relation to commerce; (4) some mention of the principal materials of commerce; and, (5) a more detailed consideration of the natural resources, chief industries, commercial products, and commercial relations of the leading countries. Special attention is given to the United States and to international trade routes, both by land and sea. Text-book, supplemented by lectures, reports on special topics, and quiz.

3. **MODERN INDUSTRIAL AND COMMERCIAL HISTORY** PROFESSOR GRAY
 Three credits (three hours per week) Both semesters
 Open to sophomores, juniors, and seniors; may be taken in conjunction with course 1 or course 2; both semesters must be completed before credit is given for the first semester.

The industrial and commercial history of western Europe and America since the middle of the eighteenth century. The effects of modern inventions and political changes on industry and trade. Lectures with prescribed topical readings. One written report of considerable length will be required each semester.

GENERAL COURSES

4. **ADVANCED ECONOMICS** PROFESSOR ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1; required for a major in economics.

An advanced course in general economics, devoted largely to a study of recent theories of distribution.

Assigned readings, reports, and discussions.

5. **MONEY AND BANKING** DR. PHELAN
 Three credits (three hours per week) Repeated each semester
 Open to those who have completed course 1.

The history and theory of money; nature and uses of credit; functions of banks, trust companies, and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings, and discussions.

28. **FINANCIAL HISTORY OF THE UNITED STATES** DR. PHELAN
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 1 and 5.

The main lines of our financial development, including our monetary and banking history, are traced by means of lectures. Readings in the literature of the subject and topics for investigation are assigned. Lectures, text-book, assigned readings, topics, and discussions.

6. **PUBLIC FINANCE** PROFESSOR ROBINSON
 Three credits (three hours per week) First semester
 Open to those who have completed course 1.

The development of the state as an economic organism. Public expenditures from the view point of public wants. Budget systems of the leading countries with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidence, and administration of taxation. The theory of public debts. Text-books, supplemented by lectures and assigned readings.

7. **PROBLEMS IN TAXATION** PROFESSOR ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 6.

Study of tax systems, tax reforms, and special forms of taxation, such as the mortgage, corporation, and inheritance taxes. Based on Seligman, *Essays in Taxation*, and reports of state tax commissions with lectures and reports on special topics.

8. **ECONOMICS OF TRANSPORTATION AND COMMUNICATION** PROFESSOR ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1 and to students in the technical colleges.

A general course on the history and theory of transportation and communication with special reference to the United States; early routes and methods of migration and commerce; causes determining the location of railways; effect of steam and electricity in the consolidation of industries

and of nations; signal systems, the post, telegraph and telephone; parcels post and express service; economic functions and relations of highways, interurban electric lines, steam railways, inland waterways, and ocean transportation; the organization of ocean commerce. Lectures, assigned readings, and discussions.

9. RAILWAY ECONOMICS

PROFESSOR ROBINSON

Three credits (three hours per week)

First semester

Open to those who have completed courses 1 and 8, and to students in the technical colleges.

An advanced course devoted to the study of railway problems and administration, including: (1) conditions affecting economy of operation; (2) passenger and goods traffic; (3) economic principles underlying the making of railway rates; (4) competition in relation to rate wars, discrimination between persons, places, and commodities, pooling, and various forms of combination; (5) the great railway systems of the United States; (6) regulation by the states and the federal government; (7) government ownership and operation of railways in Europe and Australasia. Lectures, assigned readings, and special topics.

11. THE MODERN BUSINESS CORPORATION

PROFESSOR GRAY

Three credits (three hours per week)

First semester

Open to those who have completed course 1.

The organizing, financing, and managing of corporations; the position of the corporation before the law; methods of accounting; the relation of the government to the corporation; the question of trusts in its various phases. Text-books; Ripley, *Trusts, Pools, and Corporations*, Meade's *Trust Finance*, Wyman's *Cases*. Lectures, class discussions, and reports.

10. MUNICIPAL INDUSTRIES

PROFESSOR GRAY

Three credits (three hours per week)

Second semester

Open to those who have completed course 1; if possible, should be preceded by course 11.

The causes and the social and economic effects of the recent rapid development of municipal industries. A comparison of the results of public and of private ownership of such industries. The general question of municipal ownership. Text-books, lectures, and quizzes.

12. ECONOMICS OF COMMERCE

PROFESSOR ROBINSON

Three credits (three hours per week)

First semester

Open to those who have completed course 1, 2, or 3.

Causes and characteristics of commercial crises; theory and mechanism of international commerce; free trade, reciprocity and protection; the balance of trade; economic causes of the contest for foreign markets; organization of the export trade, commercial treaties and foreign politics, the consular and diplomatic service as a factor in commerce. Lectures, assigned readings, and reports on special topics.

13. ECONOMICS OF COLONIZATION

PROFESSOR ROBINSON

Three credits (three hours per week)

Second semester

Open to those who have completed course 1, 2, or 3.

The economic causes of human migration; historical survey of colonization and classification of colonies with reference to their economic bases; existing colonial systems, with special attention to the outlying possessions of the United States; colonial commerce in relation to modern commercial and foreign policies; preferential tariffs and imperial federation. Lectures, assigned readings, and reports on special topics.

26. SOCIAL THEORIES

DR. PHELAN

Three credits (three hours per week)

First semester

Open to those who have completed course 1.

A survey of social Utopias from Plato to Henry George, with special attention to modern scientific socialism as a philosophy of industrial evolution and as a program of economic reform. Lectures, assigned readings, reports, and discussions.

27. THE STATE IN RELATION TO INDUSTRY

Three credits (three hours per week)

Second semester

Open to those who have completed courses 1 and 26.

A study of the influence exercised by society and by the state on the production and distribution of wealth. The force of custom; effect of private property and other social institutions; the results of economic legislation.

designed to limit the freedom, or raise the plane, of competition. General survey of the relation of the state to industry. Lectures, assigned readings, and reports.

16. LABOR PROBLEMS: Part I

Three credits (three hours per week)

DR. PHELAN
First semester

Open to those who have completed course 1.

Labor unions, strikes, systems of wage payment, arbitration, poverty, child labor, etc. Efforts, public and private, to secure justice and social well-being. Lectures, text-book, assigned readings, and discussions.

17. LABOR PROBLEMS: Part II

Three credits (three hours per week)

DR. PHELAN
Second semester

Open to those who have completed course 1, but should also be preceded by course 16.

A study of races and immigrants in America, with reference to their economic and social contributions; the economic and social conditions in foreign countries that lead to emigration; the general problem of immigration; the special problems of the Slav, the Italian, the negro, the Chinese and the Japanese. Lectures, text-book, topics, and discussions.

18. CHARITIES AND CORRECTIONS WITH SPECIAL REFERENCE TO ECONOMIC CONDITIONS IN AMERICAN CITIES

Three credits (three hours per week)

MR. LIES
First or second semester

Open to those who have completed course 1, course 3, or sociology 1; required in the six year medical course.

A study of the causes of economic dependence in American cities, the standard of living, and the constructive agencies for economic betterment. Given by lectures with assigned readings and visits of inspection in the Twin Cities.

BUSINESS COURSES

19. THE PRINCIPLES OF ACCOUNTING

Six credits (three hours per week)

Both semesters

Open to those who have completed course 1.

The theory and practice of accounting, with a view to general business efficiency. Methods employed in manufacturing, mercantile, banking, and railway accounting. Analysis of industrial, bank, and railway reports. Lectures and exercises.

20. ELEMENTS OF BUSINESS LAW

Three credits (three hours per week)

DR. PHELAN
Second semester

Open to those who have completed course 1.

The principles of law governing ordinary commercial transactions. The aim is to teach so much of the law as every educated man ought to know for his guidance in everyday business affairs. Assigned readings, lectures, and quizzes.

22. BUSINESS ORGANIZATION

Three credits (three hours per week)

Second semester

Open to those who have completed course 1.

A study of the internal organization and management of large-scale industry, covering typical manufacturing and mercantile concerns.

Based on Sparling's *Introduction to Business Organization*, with lectures, assigned readings, and discussions.

23. ECONOMICS OF FORESTRY AND IRRIGATION

Three credits (three hours per week)

MR. COULTER
First semester

Open to those who have completed course 1 or course 2.

Preliminary survey of forest controls and forest influences. In this connection, special attention to the progress of the national irrigation works in relation to economic development, land laws, and land tenure. Location and value of the extant forest resources of the United States. Intensive study of the forest industry, covering: (1) history and processes, (2) employees, (3) division into stages (logging, sawing, etc.), (4) internal organization of each, (5) transportation and marketing, (6) economic relations to other industries, (8) share of forest products in foreign commerce, (9) economic necessity of a scientific system of forestry. Lectures, assigned reading, and reports.

14. ECONOMICS OF AGRICULTURE

MR. COULTER

Three credits (three hours per week)

Second semester

Open to those who have completed course 1 or course 2, and to others by special permission of the instructor.

Preliminary survey and classification of industries as extractive, manufacturing, and distributive; and comparison of the several extractive industries in the United States, viz. fishing, forestry, grazing, farming, and mining. Historic development of agriculture and comparison of existing systems, with reference to stage of economic development and geographic conditions. Transition in the United States from extensive to intensive and from general to specialized farming in relation to the law of decreasing returns. Markets, transportation facilities, and other causes affecting the value of land and the prices of farm products. The size, organization, labor-system, and ownership of farms as bearing on economic efficiency and social and political conditions. Lectures, assigned readings, reports on special topics, and quiz.

15. ECONOMICS OF INSURANCE

Three credits (three hours per week)

First semester

Open to those who have completed course 1 and to others by special permission of the department.

Kinds and economic functions of insurance: life, fire, marine, accident, fidelity; history and theory of life insurance, forms of standard policies, public supervision. The aim is to treat those aspects of insurance which are of importance to practical men of affairs.

25. ECONOMICS OF INVESTMENT AND SPECULATION

Three credits (three hours per week)

First semester

Open to juniors and seniors who have completed course 5.

The causes affecting the values of securities; classes of investments and methods of calculating income; bearings of investment on the formation of social classes; the economic functions of speculation; organization and working of stock and produce exchanges; their relation to industry and to the money market; the work of Wall Street. Lectures, assigned readings, and exercises in the interpretation of current quotations for securities.

ADVANCED AND GRADUATE COURSES

29. THEORY AND PRACTICE OF STATISTICS

Two credits (two hours per week)

First semester

Open to those who have completed six credits in economics.

An introduction to the theory and method of statistics; aspects of economic and social life which are capable of statistical measurement; use and limitations of index numbers; theory of prices and price levels; based on the works of Bowley and Mayo-Smith, with lectures and practical exercises.

30. HISTORY OF ECONOMIC THOUGHT

PROFESSOR ROBINSON

Two credits (two hours per week)

First semester

Open to those who have completed six credits in economics.

A survey of economic thought, especially since Adam Smith. Emphasis is placed on the most recent period. Lectures, assigned readings, and reports on special topics.

24. SCOPE AND METHODS OF ECONOMICS

PROFESSOR ROBINSON

Two credits (two hours per week)

Second semester

Open to those who have completed six credits in economics.

Consideration of the successive views which have prevailed as to the scope and logical method of economics; relation of economics to the other social sciences and to ethics. Lectures, assigned readings, and discussions.

21. SEMINAR IN ECONOMICS

PROFESSORS GRAY AND ROBINSON,

MR. GEROULD, DR. PHELAN AND MR. COULTER

Six credits (three hours per week)

Both semesters

Open to graduate students and to seniors who have completed at least twelve credits in economics and are capable of making original investigations; both semesters must be completed before credit is given for the first semester.

A course in research and in methods of investigation. The course will be conducted jointly by all the instructors, each striving to be of special service to students who choose topics within the field of his special interests: Professor Gray in connection with local public service corporations; Professor Robinson in connection with taxation, transportation, and industries of importance in this section, such as wheat and iron; Dr. Phelan in connection with currency questions, labor, socio-economic theories, and taxation.

POLITICAL SCIENCE

Table of Courses Offered in 1908-9.

INTRODUCTORY COURSE					
No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Am. Gov't	1 or 2	3	Soph., Jr., Sr.	None
GENERAL COURSES					
2.	Comp. Gov't	1	3	Jr., Sr.	Courses 1 and 2
3.	Elements of Jurisp.....	1	3	Jr., Sr.	Course 1
7.	Municipal Adm.	2	3	Soph., Jr., Sr.	Course 1
9.	Political Parties	1	2	Sr.	Course 1
10.	Diplomacy	2	2	Soph., Jr., Sr.	Course 1
12.	Colonial Adm.	2	3	Sr.	Courses 1 and 2
15.	State and Local Adm...	2	3	Soph., Jr., Sr.	Course 1
SPECIAL COURSES					
13.	Teachers' Gov't	2	1		Course 1
16.	Engineers' Am. Gov't... ..	..	..		None
6.	Engineering Law	1	2	Sr.	None
ADVANCED AND GRADUATE COURSES					
4.	Am. Const. Law.....	1, 2	4*	Sr.	Courses 1, 2 and 8
8.	Theory of the State....	2	3	Sr.	Courses 1 and 2
5.	International Law	1, 2	6	Sr.	Courses 1 and 2
11.	Seminar .....	..	..
14.	Adm. Law.	2	2	Sr.	Courses 1, 2 and 8

*Both semesters must be completed before credit is given for the first semester.

1.	AMERICAN GOVERNMENT	PROFESSOR SCHAPER AND MR. ALLIN
	Three credits (three hours per week)	Repeated each semester
	Open to sophomores, juniors, and seniors.	
	An elementary course in American government intended as a preparation for the advanced courses in political science, for teaching in secondary schools, and for good citizenship; a study of the organization and actual workings of the national and local governments; a series of lectures on the nature and origin of the American governmental system precedes a study of the text and assigned topics; special attention will be given to important statutes on naturalization, organization of the judiciary, and of executive departments, interstate commerce, trusts, etc. Text, lectures, and special topics.	
2.	COMPARATIVE GOVERNMENT	MR. ALLIN
	Three credits (three hours per week)	First semester
	Open to those who have completed course 1.	
	A description and analysis of the government as the agent of the state; a comparative study of the organization and working of the governments of the great European powers of today, especially of France, Germany, Great Britain and Italy. Text, with lectures and assigned readings.	
3.	THE ELEMENTS OF JURISPRUDENCE	PROFESSOR SCHAPER
	Three credits (three hours per week)	First semester
	Open to those who have completed course 1.	
	A study of those human relations requiring legal regulation considered from the American point of view; the nature and source of law, status, rights and wrongs, partnership, corporations, etc. The course is intended for active citizenship and for the study of law. The student will practice looking up cases and summarizing leading principles. The course is based on a text, with lectures and assigned reading.	
4.	AMERICAN CONSTITUTIONAL LAW	PROFESSOR SCHAPER
	Four credits (two hours per week)	Both semesters
	Open to those who have completed courses 1, 2, and 8; both semesters must be completed before credit is given for the first semester; given in alternate years; not offered in 1908-9.	
	This is an advanced course in the study of the principles of our constitutional law based on important Supreme Court decisions and standard works.	

5. INTERNATIONAL LAW

Six credits (three hours per week)

MR. ALLIN
Both semesters

Open to those who have completed courses 1 and 2.

This course treats of the nature, sources, and sanction of international law; of the general principles as developed by positive agreement, common usage, and judicial decisions, in particular of the status of nations, the rules of peace, neutrality, and war, and the arbitration movement. Text, lectures, and supplementary reading.

6. ENGINEERING LAW

Two credits (two hours per week)

MR. ALLIN
First semester

Intended primarily for seniors in the College of Engineering.

7. MUNICIPAL ADMINISTRATION

Three credits (three hours per week)

PROFESSOR SCHAPER
Second semester

Open to those who have completed course 1.

A comparative study in modern city charters and methods of administration, the relation of the city to the state, the delimitation of its sphere of activity, its liability for tort, and an investigation into the causes of municipal corruption and merits of proposed reforms. A text, lectures, and special topics.

8. THEORY OF THE STATE

Three credits (three hours per week)

PROFESSOR SCHAPER
Second semester

Open to those who have completed courses 1 and 2.

A study in the theory of the state, its origin, nature, purpose and justification, the elements of population and territory. Important theories, like the divine, contract, modern socialistic, individualistic, and social welfare, are considered; also the question of state interference and state management of industries. This course includes a study of classification of law, governments, and states. A text-book, with lectures and topical readings.

9. POLITICAL PARTIES

Two credits (two hours per week)

PROFESSOR SCHAPER
First semester

Open to those who have completed courses 1 and 2.

An advanced course in political parties, their origin, development, and function. Such topics as methods of making nominations, securing minority representation, the recall, the initiative and referendum are taken up. Text, lectures, and special topics.

10. DIPLOMACY

Two credits (two hours per week)

MR. ALLIN
Second semester

Open to those who have completed course 1.

The object of this course is to outline the growth of international relations, the mode of conducting foreign affairs, the relation of the treaty-making power to legislation, the duties and immunities of diplomats, the consular service, the framing, interpretation, and termination of treaties and compacts, and the character and procedure of courts of arbitration. Considerable attention will be given to concrete illustrations of the principles of international practice as exemplified in such matters as the fisheries question, the Geneva arbitration, the Caroline incident, etc. Text, lectures, and supplementary reading.

11. SEMINAR IN POLITICAL SCIENCE

Six credits (three hours per week)

PROFESSOR SCHAPER AND MR. ALLIN
Both semesters

Open to graduate students and seniors of suitable preparation.

A seminar for research in the field of political science. A feature of the seminar is the discussion of current problems in politics and administration.

12. COLONIAL ADMINISTRATION

Three credits (three hours per week)

MR. ALLIN
Second semester

Open to those who have completed courses 1 and 2.

This course embraces a discussion of the principal classes of colonies, the causes of colonization, the social, economic, and political tendencies of colonial development, imperial relations, preferential trade, and independence. A study is made of the political systems of modern colonial governments, of the organization and administration of the Spanish, English, French, Dutch, German, and American colonies. Lectures, assigned reading, and special topics.

13. TEACHER'S COURSE IN GOVERNMENT

One credit (one hour per week)

Second semester

Open to students of suitable preparation who intend to teach

American government in the secondary schools.

Lectures and the examination of text-books, maps, and other materials useful to teachers.

14. **ADMINISTRATIVE LAW** PROFESSOR SCHAPER
Two credits (two hours per week) Second semester
Open to those who have completed courses 1, 2, and 8, and to graduates.
A course dealing with administration as a science, its origin and development, the law of officers under the national government, the merit system, and the growth of special administrative tribunals. Text, lectures, and cases.
15. **STATE AND LOCAL ADMINISTRATION** PROFESSOR SCHAPER
Two credits (two hours per week) Second semester
Open to those who have completed course 1.
A special course in the problems of our state and local governments; a comparative study of new experiments in legislation and administration, the workings of our courts, the jury system, and the new state police. Lectures, cases, and special topics.
16. **AMERICAN GOVERNMENT**
Two credits (two hours per week) First semester
Intended for students in the College of Engineering; not given until the new curriculum goes into effect.

HISTORY

The requirements for a major in history are the completion of at least twenty-four credits from courses offered by the department; for a minor, twelve credits. For distinction in history the special requirements of the department are that thirty-six credits, of which nine shall be in intensive courses, must be completed and at least twelve credits must be obtained in other departments of the social science group. To obtain the recommendation of the department for a teacher's certificate twenty-four credits must be completed from courses offered by the department, including at least six credits in intensive courses and course 16.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Europe 31 B.C.-1500 A.D.	1,2	6†	All	None
2.	Eng. Const.	1,2	6	All	Two yrs. prep. hist.
3.	Ren. and Reform.	1	3	Soph., Jr., Sr.	Course 1 or 2
4.	Europe since 1789	1,2	6	Soph., Jr., Sr.	Course 1 or 2
5.	American to 1840.....	1,2	6	Soph., Jr., Sr.	Course 2
6.	American since 1840....	1	3	Jr., Sr.	Course 5
7.	Making of Const'n.....	1,2	6*	Jr., Sr., Grad.	See statement
9.	Am. Statesmen	2	3	Jr., Sr., Grad.	Course 5
10.	Hist. Masterpiece	1	3	Jr., Sr., Grad.	See statement
11.	Am. Dipl.	1	3	Jr., Sr., Grad.	Course 5
12.	Europe Dipl.	2	3	Jr., Sr., Grad.	Course 4
14.	Auth's for N. E.	1,2	4*	Sr. Grad.	See statement
15.	Hist'l Method	2	2	Soph., Jr., Sr.	Course 1 or 2
16.	Teacher's Course	2	1	Sr. Grad.	See statement
18.	Eng. Judiciary	2	3	Jr., Sr., Grad.	See statement
21.	Hist. of Greece.....	1	3	Soph., Jr., Sr.	Course 1 or 2
22.	Greek Political Inst's...	2	3	Jr., Sr., Grad.	See statement
23.	Roman Imp. Organ. ...	2	3	Jr., Sr., Grad.	Twelve credits

†Juniors and seniors receive only half credit; not counted toward a minor in history.

*Both semesters must be completed before credit is given for the first semester.

INTRODUCTORY COURSES

Freshmen who have taken two years of history in the preparatory school may omit course 1 and begin with course 2. Course 1 admits directly to courses 2, 3, 4, 15, and 21. Course 2 is required as a prerequisite for all courses in American history (5 to 9 inclusive, 11, 13 and 14). Students who intend to specialize in history or in any social science should elect course 2 in the freshman year.

1. EUROPEAN HISTORY FROM THE ESTABLISHMENT OF THE ROMAN EMPIRE TO THE REFORMATION. 31 B. C.-1500 A. D.

ASSISTANT PROFESSOR WESTERMANN

Six credits (three hours per week)

Both semesters

Open to all, but juniors and seniors receive only half credit; especially designed for freshmen who have had less than two years of history in the preparatory school; not credited toward a minor in history.

The course will show how modern institutions are largely derived from Roman imperial institutions. The leading topics will be the gathering up of the contributions of the older world by Rome, the imperial organization of the first "political people," the Germanic invasions, the growth of the Frankish state and Charlemagne's premature attempt at organization, the medieval church, the feudal system, the crusades, the rise of the towns, and the development of modern nations. This last topic will be studied mainly as it is illustrated in the history of Germany and of France from 814 to 1500. A definite portion of the course (about one-third) will go to the careful use of source material.

2. ENGLISH CONSTITUTIONAL HISTORY TO THE ACCESSION OF GEORGE I

PROFESSOR WHITE AND MISS JUDSON

Six credits (three hours per week)

Both semesters

Open to all who have had two years of history in the preparatory school or who have completed course 1.

While the general narrative of English history is not neglected, the making and testing of the English government are the main themes of the course. Much time is spent upon the study of documents which illustrate the origin and development of important institutions.

GENERAL COURSES

3. THE RENAISSANCE AND REFORMATION

PROFESSOR WHITE

Three credits (three hours per week)

First semester

Open to those who have completed course 1 or course 2.

The Renaissance and Reformation will be studied as general European movements, with the emphasis upon the work of individual men and upon ideas rather than upon politics and institutions. The purpose of the course will be to show how the medieval world became the modern world.

4. EUROPE SINCE 1789

PROFESSOR ANDERSON

Six credits (three hours per week)

Both semesters

Open to those who have completed course 1 or 2.

The history of France occupies the most prominent place in the course, that of other countries being grouped about it, as far as possible. Much attention is given to international affairs, the principal territorial changes being illustrated with a series of wall maps prepared for the course under the direction of the instructor. A special effort is made to put the students into a position to understand the present governments and politics of the leading European states. The entire class meets twice each week for lectures or recitations. The third exercise is devoted to the study of important historical documents, drawn principally from Anderson's *Constitutions and other Select Documents Illustrative of the History of France 1789-1901*. This work is done in small groups which meet in the European history seminar room.

5. AMERICAN CONSTITUTIONAL HISTORY TO 1840

PROFESSOR WEST

Six credits (three hours per week)

Both semesters

Open to those who have completed course 2; required for courses 6 to 9 inclusive, 11, 13, 14, and 19, and therefore to students who intend to specialize in history recommended for the sophomore year.

The aim is to make this a "practice course"; the work is done partly by co-operative topical reports, and students are expected to consult primary sources to a greater degree than is possible in most undergraduate courses. During part of the year the class will meet once a week in small sections for the study of documents.

15. HISTORICAL METHOD AND BIBLIOGRAPHY PROFESSOR WHITE
 Two credits (two hours per week) Second semester
 Open to those who have completed course 1 or course 2, but
 designed only for those who intend to specialize in history.

This course aims to make clear to the student the genesis of the modern historical method and to introduce him in a practical way to the use of the best tools in historical study. The work divides naturally as follows:

1. Exercises in historical criticism and interpretation. One or more important historical sources will be studied intensively by the class.
2. History of historical writings; especially the work of Ranke and his followers and the origin of the seminar system. Some account will be taken of present methods and advantages of study in Germany and France.
3. Bibliography. Purpose, to gain a working knowledge of existing helps to historical study, such as standard bibliographies, historical magazines, source material, etc.

While the knowledge of Latin or the modern languages is an advantage, it is not a necessity in this course.

16. TEACHERS' COURSE PROFESSOR WEST
 One credit (one hour per week) Second semester
 Open to seniors and graduates who have, including courses in
 progress, twenty-four credits in history; required for those who
 obtain a teacher's recommendation in history.

This course is designed to assist those who expect to teach history in high schools. Professor West will be aided by other members of the department.

20. ENGLAND SINCE 1815 PROFESSOR ANDERSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 2; may be taken to
 advantage in connection with course 4; not given in 1908-9.

The course opens with a rapid survey from the point where course 1 stops down to 1815. From there on the work is more intensive. Through topics and assigned readings an opportunity is afforded to become acquainted with the principal British reviews and with two or three of the leading British newspapers.

21. HISTORY OF GREECE ASSISTANT PROFESSOR WESTERMANN
 Three credits (three hours per week) First semester
 Open to those who have completed course 1 or course 2.

The course is general in its nature and will cover the political and social development of the Greek states to the time of their incorporation into the Roman Empire, with particular emphasis upon the later part of the period. Especial attention will be given to the permanent influence of Greek civilization.

ADVANCED OR INTENSIVE COURSES

6. AMERICAN CONSTITUTIONAL HISTORY, 1841-1885 PROFESSOR ANDERSON
 Three credits (three hours per week) First semester
 Open to those who have completed course 2 and at least the
 first semester of course 5; given in 1908-9, and in alternate
 years thereafter.

Special attention is given to the development of the slavery issue in politics, the political history of the civil war, and reconstruction.

8. . AMERICAN HISTORY SINCE 1789 AS SHOWN IN THE DEVELOPMENT OF CONSTITUTIONAL LAW PROFESSOR WEST

Three credits (three hours per week)

First semester

Open to seniors and graduate students who have completed courses 2, 5, 6, and 7; not given in 1908-9.

This course is not designed to be a systematic treatment of either history or constitutional law. It consists of a careful analysis of cases selected from *Thayer's Cases on Constitutional Law*, studied in their historical setting and with reference to the course of development.

9. STUDIES IN AMERICAN STATESMEN

PROFESSOR ANDERSON

Three credits (three hours per week)

Second semester

Open to juniors, seniors, and graduate students, who have completed course 2 and at least the first semester of course 5.

A research course. Each member of the class makes a study of some prominent American statesman who has left a considerable body of materials valuable for information upon his own career and the general history of the United States. The greater part of the work consists in the sifting of these materials and the preparation of brief reports in regard to points assigned for investigation. The class exercises are chiefly devoted to the criticism of these reports and the synthesis of the results thus obtained. Only a limited period is traversed. In 1908-9 the work will be confined to the period of the the Federalist supremacy, 1789-1801.

10. A CRITICAL STUDY OF A HISTORICAL MASTERPIECE

PROFESSOR ANDERSON

Three credits (three hours per week)

First semester

Open to those who have completed course 5.

The object of this course is to develop the habit of reading history critically. Each year a masterpiece of historical literature will be minutely and critically studied. Each student will be required to read critically the entire work studied and, in addition, to analyze and report upon assigned portions of it. These reports will be made the basis of the class work, which will consist mainly of discussions carried on by the students under the direction of the instructor. In 1908-9 Rhodes' *History of the United States from the Compromise of 1850 to the Restoration of Home Rule in the South in 1877* will be read.

11. THE HISTORY OF AMERICAN DIPLOMACY

PROFESSOR ANDERSON

Three credits (three hours per week)

First semester

Open to seniors and graduates who have completed course 5.

A research course dealing principally with the more important features of American foreign policy during the earlier years of the federal government.

12. THE HISTORY OF EUROPEAN DIPLOMACY SINCE 1789

PROFESSOR ANDERSON

Three credits (three hours per week)

Second semester

Open to seniors and graduates who have completed or are taking course 4; ability to read easy French is required.

This course centers about the critical reading of the principal treaties and numerous state papers dealing with international relations.

13. COLONIAL EXPANSION AND ADMINISTRATION

PROFESSOR WEST

Three credits (three hours per week)

Second semester

Open to seniors and graduate who have completed course 4 or course 5; given in alternate years; not offered in 1908-9.

The history of the colonial acquisitions of the great nations will be surveyed rapidly and colonial institutions and governments will be studied and compared in detail.

14. A CRITICAL STUDY OF AUTHORITIES FOR EARLY NEW ENGLAND HISTORY

PROFESSOR WEST

Four credits (two hours per week)

Both semesters

Open to seniors and graduates who have completed eighteen credits, including course 5; both semesters must be completed before credit is given for the first semester; given in alternate years.

This is primarily a course in historical criticism, based on a minute study of Winthrop's *History of New England*. Each member of the seminar has a group of secondary authorities assigned him which he is to criticize in the light of the original sources. The study involves also a careful comparison of the chief sources with one another, and incidentally it leads to a minute treatment of political, social, and economic development in early New England. The number admitted to the course is limited to seven.

17. **MEDIAEVAL ECONOMIC DOCUMENTS** PROFESSOR WHITE
 Two credits (two hours per week) Second semester
 Open to seniors and graduates who have completed twelve credits
 in history; not given in 1908-9.
 Characteristic documents relating mainly to twelfth and thirteenth century economic history are to be carefully studied with reference both to language difficulties and historical criticism. Such documents will be selected as will tend to throw the most light on the leading economic problems of the medieval period. The work is to be based on Fagniez's *Documents relatifs a l'histoire du commerce en France*.
18. **ORIGIN OF THE ENGLISH JUDICIAL SYSTEM** PROFESSOR WHITE
 Three credits (three hours per week) Second semester
 Open to juniors, seniors, and graduates, who have completed six credits, including course 2, and obtain the permission of the instructor; students must be able to read medieval Latin, and Latin 9 is recommended to give this preparation.
 The work will consist of detailed study in the sources of the twelfth and thirteenth centuries, and will aim to show how the kings' court, from which the present judicial system has grown, superseded the older communal and private courts, the development of the primitive king's court into a system of courts, and the growth in it of a new procedure. In this last connection the critical stages in the early history of the jury will receive special attention.
19. **THE EXPANSION OF AMERICA, STUDIED IN ITS HIGHWAYS OF EMIGRATION**
 Six credits (three hours per week) Both semesters
 Open to seniors and graduates who have completed course 5;
 both semesters must be completed before credit is given for the first semester; not given in 1908-9.
 This is a study of roads and methods of pioneer travel in that westward movement of population which extended the inhabited area of the United States from the seaboard to the Mississippi.
22. **GREEK POLITICAL INSTITUTIONS** ASSISTANT PROFESSOR WESTERMANN
 Three credits (three hours per week) Second semester
 Open to juniors, seniors, and graduates, who have completed courses 1 or 2, 21, and six additional credits.
 A study of the development of Greek political forms and of their operation as seen in typical oligarchic, democratic, federal, and monarchic states.
23. **ROMAN IMPERIAL ORGANIZATION** ASSISTANT PROFESSOR WESTERMANN
 Three credits (three hours per week) Second semester
 Open to juniors, seniors, and graduates, who have completed twelve credits.
 This course will survey the development and organization of the imperial system from the beginning of Roman expansion outside of Italy to the time of the Germanic invasion. Special attention will be given to the administration of the municipalities and provinces under the Empire and to the development of despotism.

SOCIOLOGY AND ANTHROPOLOGY

The requirement for a major in sociology and anthropology is the completion of eighteen credits from courses offered by the department; for a minor, twelve credits. For distinction in sociology and anthropology the special requirements of the department are the completion of twenty-four credits, at least six of which shall be advanced work, three of which shall be from courses offered below, and three from individual work done under special direction of the department.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Descrip. Sociology.....	1	3	Jr., Sr.	None
2.	Elements of Sociol.	1 or 2	3	Jr., Sr.	None
3.	Social Pathology	1	3	Jr., Sr.	None
4.	Social Theory	1	3	Sr.	Course 1 or 2
5.	Social Groups	1	3	Sr.	Course 1
6.	Institutions	1	3	Sr.	Course 1
7.	Anthropology	1	3	Jr., Sr.	None
8.	Ethnology	2	3	Jr., Sr., Grad.	Course 1, 2 or 7
9.	Philippine People	2	3	Jr., Sr., Grad.	None
10.	Physical Anthropology..	2	3	Jr., Sr., Grad.	Course 7 or 8
11.	Am. Negro Race.....	2	3	Jr., Sr., Grad.	None
12.	Am. People	1	3	Jr., Sr., Grad.	None
13.	Biblical Sociology	1	3	Jr., Sr., Grad.	None
14.	Mod. Soc. Institutions..	1.	3	Sr.	Course 7

1. DESCRIPTIVE SOCIOLOGY

PROFESSOR JENKINS

Three credits (three hours per week)

First semester

Open to juniors and seniors.

This is a preliminary course designed as the first work of students in the department. It presents concrete data concerning human association showing groups of peoples living in the four grades of culture called savagery, barbarism, civilization, and enlightenment; and it discovers the activities and institutions natural and peculiar to these cultures. Text-book, lectures, assigned readings, and thesis.

2. ELEMENTS OF SOCIOLOGY

ASSISTANT PROFESSOR REEF

Three credits (three hours per week)

Repeated each semester

Open to juniors and seniors.

This course is designed to give a general knowledge of the field of modern sociology, the attempt being to prepare students for such special sociological investigations as they may wish to make. Text-book, lectures, assigned readings, and thesis.

3. SOCIAL PATHOLOGY

PROFESSOR SMITH

Three credits (three hours per week)

First semester

Open to juniors and seniors.

Dealing with problems of poverty, crime, insanity, social degeneration, and a discussion of the child problem and methods of social amelioration.

4. SOCIAL THEORY

ASSISTANT PROFESSOR REEF

Three credits (three hours per week)

First semester

Open to those who have completed course 1 or 2.

This course includes a study of the leading American, English, French, and German writers to discover their methods of approach to the science and the leading results they have secured.

5. SOCIAL GROUPS

PROFESSOR SMITH

Three credits (three hours per week)

First semester

Open to those who have completed course 1.

An examination of the clan and the village in primitive life, a study of demography to discover the effect of environment upon social organization, and a comparison with the nature of and reasons for the modern city.

6. THE STUDY OF INSTITUTIONS

PROFESSOR SMITH

Three credits (three hours per week)

First semester

Open to those who have completed course 1.

The genesis of custom and the beginnings of law with the geographical and race influence in the growth of states will be studied as well as the various forms of the family and their relation to forms of civilization.

7. ANTHROPOLOGY

PROFESSOR JENKINS

Three credits (three hours per week)

First semester

Open to juniors and seniors.

This is an elementary course studying the essential characteristics of mankind and the general features of the several races of men. It also investigates the origin and development of the series of activities and various institutions which have had their beginnings in primitive society. Text books, lectures, assigned readings, and thesis.

8. ETHNOLOGY**PROFESSOR JENKS**

Three credits (three hours per week)

Second semester

Open to juniors and seniors who have completed course 1, 2, or 7, and to graduate students.

This is a study of the different races of men in America, Europe, Asia, Africa, and Oceania; the various historical classifications of men into races are presented; the causes of the origin and distribution of the several races and subraces are sought, and from historical perspective and present indications an attempt is made to judge of the future development of races; ethnological problems are also presented. Text-books, lectures, assigned readings, and thesis.

9. THE PHILIPPINE PEOPLE**PROFESSOR JENKS**

Three credits (three hours per week)

Second semester

Open to juniors, seniors, and graduate students.

This course presents the geography, natural resources, and ethnology of the Philippine Islands. A careful comparative study of the four large ethnic and culture groups of people is made; tropical influences are noted; the present policy of the Insular Civil Government is outlined, so far as it tends to modify the natural characteristics and modern culture of the inhabitants, and to affect American home interests in the orient. This course aims to present a practical model for the investigator of human culture, and to introduce students to oriental race problems; it will also better fit students for government, business, or missionary service in the orient. Lectures, illustrated lectures, assigned readings, and thesis.

10. PHYSICAL ANTHROPOLOGY**PROFESSOR JENKS**

Three credits (three hours per week)

Second semester

Open to juniors and seniors who have completed course 7 or 8, and to graduate students.

This course studies the physical variations in the human body. It pays special attention to those variations which distinguish one race or group of men from another; and it seeks the cause and significance of such variations. It also attempts to trace the physical evolution of the human body and to forecast its future, studying both its development and decline. Six lectures on the development and anatomy of the human brain are given by Dr. Charles A. Erdmann of the medical faculty. This course is of prime importance to advanced students preparing for the medical course. Lectures, laboratory work, assigned readings, and thesis.

11. THE AMERICAN NEGRO RACE**PROFESSOR JENKS**

Three credits (three hours per week)

Second semester

Open to juniors, seniors, and graduate students; not given in 1908-9.

This course begins with a study of the negro's African tribal kinsmen, and traces the rise and development of the American negro race from the birth of American slavery. The present characteristics, traits, and conditions of the negro are especially considered. The developing tendencies of the negro are studied for the purpose of considering the probable future of the American negro race. Lectures, assigned readings, and thesis.

12. THE AMERICAN PEOPLE**PROFESSOR JENKS**

Three credits (three hours per week)

First semester

Open to juniors, seniors, and graduate students.

This course presents the distribution in the United States of the different peoples of the world found here. It seeks the natural genius of the peculiar home development of these peoples, and notes the modifications of this development in America, thus portraying the ethnic contribution of each to American civilization. It aims to discover the dominant physical, mental, and moral characteristics of each people, and attempts to determine the relative ethnic and culture importance of each to the nation.

13. BIBLICAL SOCIOLOGY**PROFESSOR SMITH**

Three credits (three hours per week)

First semester

Open to juniors, seniors, and graduate students.

Lectures, and the Old Testament as a text book.

14. MODERN SOCIAL INSTITUTIONS**ASSISTANT PROFESSOR REEP**

Three credits (three hours per week)

First semester

Open to those who have completed course 7.

The fundamental social institution, the family, will be studied, as also the development of modern industrial, political, educational, and ecclesiastical institutions in their relation to human progress.

IX. Fine Arts

DRAWING

The practical aim of this work in the University is two-fold, to help the students who need drawing for scientific work and to train those who wish to prepare for teaching drawing. The educational side of the work is emphasized in the development of the powers of the mind in the order of observation, memory, and imagination. Special efforts are made toward educating the taste to an appreciation of what is good in form, construction, and color, and in showing the relation of artistic and esthetic principles to life.

A certain amount of work is given in the different mediums used in the schools and in the representative, decorative and constructive work found in all educational courses in drawing.

Lectures are offered on the theory and practice of drawing as related to education and on the principles which are at the foundation of all art, illustrating those by the best examples of pictorial and decorative work.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Representative Drawing.	1	3	Jr., Sr.	None
2.	Adv. Drawing	2	3	Jr., Sr.	Course 1
3.	Design	1, 2	6	Sr.	Course 1 or 2
4.	Historical Design	1, 2	6	Jr., Sr.	Course 1
5.	Drawing and Education.	1	3	Sr.	
6.	Teaching of Drawing...	2	3	Sr.	Course 3

1. REPRESENTATIVE DRAWING

MISS CLOPATH

Three credits (three hours per week)

First semester

Open to juniors and seniors.

The course includes: Drawing from objects, plants, landscape, and figure poses in pencil and in water color; the study of perspective; work from cast in charcoal; brush drawing.

2. ADVANCED REPRESENTATIVE DRAWING

MISS CLOPATH

Three credits (three hours per week)

Second semester

Open to juniors and seniors who have completed course 1.

More advanced work from objects and from cast; work in water color and colored chalks; pen and ink drawing; simple exercises in lettering and composition.

3. DESIGN

MISS CLOPATH

Six credits (three hours per week)

Both semesters

Open to seniors who have completed courses 1 and 2.

Exercises in composition, illustrating the various principles of decorative work; adaptation of plant forms, stencils, illuminated lettering; designs applied to simple forms of handicraft; lectures on the fundamental principles of designs illustrated by art masterpieces.

4. HISTORICAL DESIGN

MISS CLOPATH

Six credits (three hours per week)

Both semesters

Open to juniors and seniors who have completed course 1.

Original designs in different styles applied to articles of household use; color harmony; simple forms of pottery with applied designs. Lectures and collateral reading.

5. DRAWING AS RELATED TO EDUCATION

MISS CLOPATH

Three credits (three hours per week)

First semester

Open to juniors and seniors who have completed course 1.

Exercises in all the different kinds of art work used in the schools; advanced work in black and white, and in color.

6. THE TEACHING OF DRAWING

MISS CLOPATH

One credit (one hour per week)

Second semester

Open to seniors who have completed course 3.

This course is conducted by lectures and collateral reading on the methods and educational value of drawing, as revealed through a study of the instincts and mental processes of the child.

MUSIC

Students entering the University for the express purpose of studying music must register for courses 1 and 4 and in addition two other three-hour subjects outside of the department of music.

The practical aim of the theoretical courses is to acquaint the student with the laws underlying musical composition, enabling him at the same time through critical analysis to arrive at the keenest preception and appreciation of master works in music, and finally to stimulate latent talent to self-expression of musical thoughts in correct form. A certificate of proficiency in music will be granted to students who having completed the theoretical courses and two years of pianoforte, are able to play one of the standard concertos, and in addition show marked musical ability.

Table of Courses Offered in 1908-9.

No.	Title	Semester	Credits	Offered to	Prerequisite
1.	Harmony	1, 2	4	Jr., Sr.	None
2.	Counterpoint	1, 2	4	Jr., Sr.	See statement
3.	Form and Composition.	2	2	Sr.	See statement
4.	Pianoforte	1, 2 3 or 6		Jr., Sr.	See statement
6.	History of Music	1, 2	2	Jr., Sr.	None

1. HARMONY

ASSISTANT PROFESSOR SCOTT

Four credits (two hours per week) Both semesters

Open to juniors and seniors; the fee is four dollars per semester.

The study of chords, their construction, relations, and progressions. The work consists of written exercises on basses, and the harmonization of given melodies. Foote and Spaulding's *Modern Harmony* is used as text book.
2. COUNTERPOINT

ASSISTANT PROFESSOR SCOTT

Four credits (two hours per week) Both semesters

Open to juniors and seniors who have a thorough knowledge of harmony; the fee is four dollars per semester.

The work will include the harmonization of melodies in two, three, and four voices in the different orders of counterpoint. Spaulding's *Tonal Counterpoint* is used as a text-book.
3. MUSICAL FORM AND FREE COMPOSITION

ASSISTANT PROFESSOR SCOTT

Two credits (two hours per week) Second semester

Open to seniors who have completed course 1 and the first semester of course 2; intended for those specializing in music and can be taken only with the consent of the instructor; the fee is four dollars per semester.

At the close of the year a program of original composition will be given.
4. PIANOFORTE

PROFESSOR OBERHOFFER AND ASSISTANT PROFESSOR SCOTT

Three or six credits (one and a half or three hours per week) Both semesters

Open to juniors and seniors; intended for those who intend to pursue the higher branches of the pianoforte, the art of playing, or to fit themselves for piano teachers; other arrangements may be ascertained upon application to the department.

While private lessons are the rule, classes of not more than four students may be arranged. Students in this course should have mastered technical difficulties of the degree of Czerny's *School of Velocity* and the easier Haydn and Mozart sonatas.
5. CHORAL CULTURE

PROFESSOR OBERHOFFER

Four credits (two hours per week) Both semesters

Open to juniors and seniors; a single credit may be secured for chorus work, provided that students pursuing the work for credit pursue courses 1 or 2 at the same time; students may pursue the chorus work, without credit, by paying the required fee and securing consent of the director.

A popular course in choral practice for four-part mixed voices, with occasional selections for male voices and female voices separately; features: sight singing with hints on proper tone-production, correct breathing, vocalization and solfeggio; the art-forms in choral compositions will be studied and analyzed. (Chorus a capella, motet, cantata, oratorio.)

6. HISTORY OF MUSIC

ASSISTANT PROFESSOR SCOTT

Two credits (one hour per week)

Both semesters

Open to juniors and seniors; the fee is four dollars per semester.

A literary course. Lectures are given on the development of music from the time of Palestrina to the present day.

X. Military Science and Tactics**CAPTAIN EDWARD SIGERFOOS, Ph.B., 5th U. S. Infantry, Commandant.**

Drill is required of all men in the freshman and sophomore classes. It may be taken voluntarily by others outside of the freshman and sophomore classes; and, to encourage this, as it is considered beneficial, not only to the individual student, but to the state generally, the extra work is considered by allowing a year's drill to count as a two-hour credit for one semester, but no credit will be allowed for such drill for less than one year.

For the instruction in military drill and administration the students are organized into a corps of cadets, consisting of three battalions of infantry, a band and a platoon of artillery.

A uniform of prescribed pattern is worn by all cadets during drill. The uniform consists of blouse, trousers, and cap, modelled after the United States Military Academy cadet uniform. It costs in Minneapolis about fifteen dollars and is as neat and economical a dress as the student can obtain.

Each student registered for military drill is required to make a deposit of five dollars with the accountant of the university to cover loss and breakage of equipments. The deposit is returned to the student on the return of the equipments issued to him.

Military instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor, and obedience to lawful authority, as well as to familiarize students with company and battalion manoeuvres, guards, and the theoretical and practical use of firearms.

On the graduation of each class the commandant will report to the adjutant general of the army the names of three graduates who have shown special aptitude for the military service and furnish a copy thereof to the adjutant general of the state.

The officers and non-commissioned officers are required to be good students in the other departments, soldier-like in the performance of their duties, exemplary in their general deportment, and able to pass a creditable examination in drill regulations. In general, the officers are selected from the senior class; the sergeants from the junior class; and the corporals from the sophomore class.

The required course of instruction in military science consists of:

Freshman year: practical instruction in schools of the soldier, company, and battalion; signals, ceremonies; schools of the cannoneer and battery.

Sophomore year: practical and theoretical instruction in schools of the company and battalion; advance and rear guard drill; practical and theoretical instruction in guard duty; gallery practice; ceremonies.

During the second semester a course of instruction, two hours per week, is open to juniors and seniors. When satisfactorily completed it will give, in connection with the year's drill, four credits. The course includes theoretical instruction in field service, consisting of organization, orders, advance and rear guards, out posts, reconnaissance, camping; duties of company commanders; articles of war; records.

ROSTER OF THE CORPS OF CADETS.**CADET COLONEL****H. P. Councilman****CADET MAJORS**

D. I. Okes, Second Battalion
L. A. Frye, First Battalion
A. B. Lathrop, Third Battalion

BAND

B. A. Rose, Instructor of Music
 J. S. Mikesch, Cadet Chief Musician
 R. T. Glyer, Cadet Principal Musician

CADET CAPTAINS

J. H. Ray, Regimental Adjutant
 C. S. Wilson, Company I
 A. L. McAfee, Regimental Quartermaster
 Edwin G. Eklund, Company B
 W. D. Shaw, Company C
 W. B. Crosby, Company F
 H. C. Deering, Company G
 H. D. Frary, Battery
 H. G. Knowlton, Company H
 Guy C. Bland, Company E
 C. C. Houston, Company D
 J. R. Smith, Company A
 J. W. Haw, Company K
 C. J. Eklund, Company L
 W. F. Cantwell, Company M
 F. E. Shumway, Company N
 E. H. King, Company O.

CADET FIRST LIEUTENANTS

L. W. King, Adjutant Second Battalion
 L. S. Diamond, Adjutant First Battalion
 L. B. Swain, Adjutant Third Battalion
 P. L. Sheaf, Quartermaster Third Battalion
 W. T. Newton, Company B
 R. V. Hauser, Company E
 C. Dana McGrew, Company F
 Walter Mallory, Company A
 F. G. Scobie, Company D
 R. H. Cone, Company H
 M. B. Moyer, Company C
 W. L. Councilman, Company I
 R. W. Foulke, Company G
 E. Reiff, Battery
 H. N. Bush, Company K
 C. A. Jones, Company L
 E. A. Maylott, Company M
 H. A. Follingstad, Company N
 C. F. Dow, Company O

CADET SECOND LIEUTENANTS

Willis Shippan, Company B
 S. G. Mooney, Company G
 R. Nelson, Company A
 H. J. Cliff, Company C
 M. V. Jeness, Company D
 A. B. Stork, Company D
 C. L. Hamilton, Company A
 W. G. Workman, Company E
 J. R. Buffington, Company F
 Zenas Potter, Company H
 W. D. Timperly, Battery
 G. M. Briggs, Assistant Adjutant Third Battalion
 H. R. Blackburn, Company K
 M. C. Brownell, Company L
 C. L. Adly, Company M
 W. E. Mather, Company N

PHYSICAL CULTURE

For Women

MISS BUTNER AND MISS MATSON

The course in physical culture is offered to the women of the University as a regular part of their work in the freshman year, and may be taken in any of the following years. A full year of work, in addition to the work required in this department, counts as a two-hour credit in the second semester of the senior year. The work consists of systematic exercises for the development of all parts of the body. Women pursuing this course are required to provide themselves with a gymnasium suit, consisting of a blouse waist and bloomers, with the regulation gymnasium shoes. All suits must be of black material.

It is a common observation that students often enter the University with an imperfect physical development because of an excessive use of some muscles, while others are weakened through disuse. This occasions attitudes and movements that are unseemly in appearance and unhealthful in their general effect. The purpose of this course, therefore, is to develop a strong and symmetrical physique with a graceful and easy carriage. A physical examination is made of each student and physical measurements are taken in the fall and again in the spring.

In addition to the regular class work, sports and pastimes are open to all young women of the University. These include basket ball, battle ball, numerous other ball games, and also running games, all of which tend to cultivate the play instinct and give the nerve stimulus that comes from natural play.

For Men

DR. COOKE AND DR. LITZENBERG

A well-equipped gymnasium in charge of a professional medical director is open for the young men. The training and exercise is under the immediate oversight and authority of the medical director and is wholly with a view to the healthful physical development of the whole student body.

All young men are required to be examined by the medical director of physical culture upon registration and during the course as often as the indications of the physical condition may require.

The decision of the director will be either:

1. Advisory, indicating what course of hygiene and exercise will best sustain and improve the health of the student, or
2. Mandatory requiring the students to pursue the course of hygiene and physical exercise necessary for the proper care of health and the discharge of their duties as students.

Gymnasium work is required of all men in the freshman class, one hour per week (in two half-hour periods, if the director so decides) throughout the year. The required work includes a course of lectures on personal hygiene during the first semester.

Six-Year Medical Course

In the year 1903-04 the University established a six-year course of study arranged especially for students of medicine. The first two years of the course are given in the College of Science, Literature and the Arts, and the last four years are given in the College of Medicine and Surgery. It leads to the degree of bachelor of science at the end of the first four years, and to the degree of doctor of medicine at the end of the six years course.

In the College of Science, Literature, and the Arts the year is divided into two semesters. In the College of Medicine and Surgery the year is divided into four quarters (half semesters). In the College of Medicine and Surgery the work is given on a concentration plan, but two subjects being carried at a time, and consequently a greater number of hours per week.

Students who enter without French or German are required to take German one, ten credits, and German three (scientific), six credits.

Students entering with two years of German may take French one, ten credits, in either first or second year, and German three, six credits, in the other year.

COURSES IN THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

Page references refer to the bulletins of the College of Science, Literature and the Arts, and of the College of Medicine and Surgery for more detailed information.

FIRST YEAR

ANIMAL BIOLOGY (See p. 69)

- | | |
|---|--|
| 1. GENERAL ZOOLOGY | PROFESSOR SIGERFOOS, ASSISTANT PROFESSORS
OESTLUND, BROWN, AND DOWNEY |
| Six credits (six hours per week) | First and second semesters |

BOTANY (See p. 72)

- | | |
|---|--|
| 1. GENERAL BOTANY | PROFESSOR CLEMENTS, ASSISTANT PROFESSORS
TILDEN AND ROSENDAHL AND INSTRUCTORS |
| Six credits (six hours per week) | First and second semesters |

CHEMISTRY (See pp. 75-76)

1. **GENERAL CHEMISTRY** **MISS COHEN AND MR. BADGER**
OR,
2. **ADVANCED GENERAL CHEMISTRY** **PROFESSOR FRANKFORTER, MISS COHEN,**
AND MR. BADGER
Six credits (six hours per week) **First and second semesters**

GERMAN (See p. 63)

1. **BEGINNING GERMAN** **PROFESSOR SCHLENKER, ASSISTANT PROFESSORS**
WILKIN AND JURGENSEN, MR. BURKHARD AND MR. WILLIAMS
Ten credits (five hours per week) **First and second semesters**

MATHEMATICS (See p. 86)

3. **SECOND PART HIGHER ALGEBRA** **PROFESSOR BAUER, ASSISTANT PROFESSOR**
BUSSEY, DR. MANCHESTER, MR. DALAKER AND MR. SHUMWAY
Three credits (three hours per week) **First semester**
4. **TRIGONOMETRY** **PROFESSOR BAUER, ASSISTANT PROFESSOR BUSSEY**
DR. MANCHESTER, MR. DALAKER AND MR. SHUMWAY
Three credits (three hours per week) **Second semester**

MILITARY DRILL **CAPTAIN EDWARD SIGERFOOS, U. S. A.**
Required of all men **First and second semesters**

GYMNASIUM **DR. COOKE**
Required of all men **First and second semesters**

SECOND YEAR**ANIMAL BIOLOGY (See p. 70)**

4. **COMPARATIVE ANATOMY OF VERTEBRATES** **ASSISTANT PROFESSOR BROWN**
MR. JOHNSON
Six credits (six hours per week) **First and second semesters**

CHEMISTRY (See p. 76)

3. **QUALITATIVE ANALYSIS** **ASSISTANT PROFESSOR NICHOLSON,**
MR. FRARY AND ASSISTANTS
Six credits (six hours per week) **First and second semesters**

ECONOMICS (See pp. 98 and 101)

1. **ELEMENTS OF ECONOMICS** **PROFESSOR ROBINSON, DR. PHELAN, AND**
MR. COULTER
Three credits (three hours per week) **First semester**
18. **CHARITIES AND CORRECTIONS** **MR. LIES**
Three credits (three hours per week) **Second semester**

FRENCH (See p. 65)

1. **BEGINNING FRENCH** **ASSISTANT PROFESSORS ANDRIST AND**
FRELIN, MADAME BERTIN
Ten credits (five hours per week) **First and second semesters**

GERMAN (See p. 63)

3. **SCIENTIFIC INTERMEDIATE** **ASSISTANT PROFESSOR JUERGENSEN**
Six credits (three hours per week) **First and second semesters**

RHETORIC (See p. 54)

1a. RHETORIC

MR. FIRKINS, MR. NICHOLS, MISS MALEY,
MISS GRIFFITH, MISS WHITNEY
Six credits (three hours per week) First and second semesters

MILITARY DRILL

Required of all men

CAPTAIN EDWARD SIGERFOOS, U. S. A.
First and second semesters

COURSES IN THE COLLEGE OF MEDICINE AND SURGERY

THIRD YEAR

ANATOMY (See p. 45)

1. OSTEOLOGY

PROFESSOR ERDMANN, DR. HARE

Six credits (18 lectures and recitations per week for six weeks)

First quarter

2. SYNDESMOLOGY

PROFESSOR ERDMANN, DR. HARE

Three credits (18 lectures and recitations per week for three weeks)

First quarter

3. DISSECTIONS

ASSISTANT PROFESSOR MEYER, DRs. HARE AND TYRELL

Seven and one-half credits (21 hours per week for nine weeks)

Second quarter

CHEMISTRY (See p. 50)

6. ORGANIC CHEMISTRY

PROFESSOR FRANKFORTER, ASSISTANT

PROFESSOR DERBY, MR. HANDY

Fifteen credits (six lectures, six laboratory periods)

Third and fourth quarters

HISTOLOGY AND EMBRYOLOGY (See pp. 46-48)

1. GENERAL VERTEBRATE MORPHOLOGY AND HISTOLOGY

PROFESSOR LEE

ASSOCIATE PROFESSOR NICKERSON

Four and one-half credits (six lectures and recitations, three laboratory periods)

First quarter

2. MICROSCOPIC ANATOMY OF MAN AND VERTEBRATES

PROFESSOR LEE,

ASSOCIATE PROFESSOR NICKERSON

Four and one-half credits (six lectures and recitations, three laboratory periods)

Second quarter

11. ELEMENTS OF VERTEBRATE EMBRYOLOGY

PROFESSOR LEE, ASSOCIATE

PROFESSOR JOHNSTON

Four and one-half credits (six lectures and recitations, three laboratory periods)

First quarter

12. ADVANCED VERTEBRATE EMBRYOLOGY

PROFESSOR LEE, ASSOCIATE

PROFESSOR JOHNSTON

Three credits (two lectures and recitations, one laboratory period)

Second quarter

21. ELEMENTS OF MAMMALIAN NEUROLOGY

ASSOCIATE PROFESSOR

JOHNSTON, DR. INGBERT

Three credits (two lectures and recitations, one laboratory period)

Second quarter

PHYSIOLOGY (See pp. 51-52)

1. GENERAL CELLULAR PHYSIOLOGY

PROFESSOR BEARD, ASSISTANT

PROFESSOR WILCOX, DR. SEDGWICK

Four and one-half credits (twelve lectures and recitations, six laboratory periods)

Third quarter

2. PHYSIOLOGY OF MUSCULO-NEUROUS MECHANISMS

PROFESSOR BEARD,

ASSISTANT PROFESSOR WILCOX, DR. SEDGWICK

- Four and one-half credits (twelve lectures and recitations, six laboratory periods) Third quarter
3. **SYSTEMIC PHYSIOLOGY** PROFESSOR BEARD, ASSISTANT PROFESSOR WILCOX, DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Fourth quarter
4. **SYSTEMIC PHYSIOLOGY (Continued)** PROFESSOR BEARD, ASSISTANT PROFESSOR WILCOX, DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Fourth quarter

FOURTH YEAR

ANATOMY (See p. 45)

4. **DISSECTIONS** ASSISTANT PROFESSOR MEYER, DRs. HARE AND TYRELL
Nine credits (twenty-four hours per week for nine weeks) Third quarter

CHEMISTRY (See p. 50)

7. **TOXICOLOGY, WATER AND FOOD ANALYSIS** PROFESSOR FRANKFORTER, ASSISTANT PROFESSORS HARDING AND DERBY
Three and three-quarter credits (three lectures, three laboratory periods) Second quarter

HISTOLOGY AND EMBRYOLOGY (See pp. 46-48)

3. **MICRO-TECHNIQUE AND THE MORPHOLOGY OF THE SPECIAL SENSE ORGANS** PROFESSOR LEE
Four and one-half credits (six lectures and recitations, three laboratory periods) Third quarter
13. **SPECIAL EMBRYOLOGY OF MAN AND VERTEBRATES** PROFESSOR LEE
Four and one-half credits (six lectures and recitations, three laboratory periods) Third quarter
22. **THE HUMAN NERVOUS SYSTEM** ASSOCIATE PROFESSOR JOHNSTON, DR. INGERT
Four and one-half credits (six lectures and recitations, three laboratory periods) First quarter

PATHOLOGY AND BACTERIOLOGY (See pp. 56-57)

1. **GENERAL PATHOLOGY** PROFESSOR WESBROOK
Three credits (six lectures, recitations and demonstrations) Fourth quarter
2. **GENERAL PATHOLOGY** DRs. MULLIN AND ROBERTSON
Three credits (six lectures, recitations and demonstrations) Fourth quarter
3. **GENERAL PATHOLOGY** PROFESSOR WESBROOK, DRs. MULLIN AND ROBERTSON
Three credits (twelve hours laboratory) Fourth quarter
4. **GENERAL BACTERIOLOGY** ASSISTANT PROFESSOR HILL, DR. PRATT
Three credits (six lectures, recitations and demonstrations) Fourth quarter
5. **GENERAL BACTERIOLOGY** PROFESSOR WESBROOK, ASSISTANT PROFESSOR HILL, DR. PRATT
Four and one-half credits (eighteen hours laboratory) Fourth quarter

PHARMACOLOGY (See p. 53)

1. **ELEMENTARY PHARMACY** PROFESSOR BROWN
Four and one-half credits (six lectures and recitations, three laboratory periods)
2. **GENERAL PHARMACODYNAMICS** PROFESSOR BROWN
Four and one-half credits (six lectures and recitations, three laboratory periods)

PHYSIOLOGY (See p. 52)

5. **METABOLISM AND NUTRITION** PROFESSOR BEARD, ASSISTANT
PROFESSOR WILCOX, DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) First quarter
6. **PHENOMENA OF STIMULATION** PROFESSOR BEARD, ASSISTANT
PROFESSOR WILCOX, DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) First quarter
7. **PHYSIOLOGY OF SPECIAL SENSE ORGANS** PROFESSOR BEARD, ASSISTANT
PROFESSOR WILCOX, DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Second quarter
8. **PHYSIOLOGY OF CENTRAL NERVOUS SYSTEM** PROFESSOR BEARD, ASSISTANT
PROFESSOR WILCOX, DR. SEDGWICK
Four and one-half credits (twelve lectures and recitations, six laboratory periods) Second quarter

THE COLLEGE of ENGINEERING
and THE MECHANIC ARTS

The Purposes of the College

The College of Engineering and the Mechanic Arts was founded in accordance with the Laws of the State of Minnesota and of the Federal Government, its object being "to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." It offers courses of study, of five years each, in civil, mechanical, electrical and municipal engineering, leading to the degrees of civil, mechanical or electrical engineer, the degree of Bachelor of Science being conferred at the end of the fourth year. This college also offers work in the graduate school leading

The College of Engineering and the Mechanic Arts

FACULTY

CYRUS NORTHROP, LL.D., *President*

FREDERICK S. JONES, M.A., *Dean*

FREDERICK H. BASS, B.S., *Assistant Professor of Municipal and Sanitary Engineering*

WILLIAM E. BROOKE, B.C.E., M.A., *Professor of Mathematics and Mechanics*

CHARLES W. BENTON, M.A., Litt.D., *Professor of French*

FREDERICK E. CLEMENTS, Ph.D., *Professor of Botany*

FRANK H. CONSTANT, C.E., *Professor of Structural Engineering*

HENRY T. EDDY, C.E., Ph.D., LL.D., *Professor of Mathematics and Mechanics*

HENRY A. ERIKSON, E.E., *Assistant Professor of Physics*

JOHN J. FLATHER, Ph.B., M.M.E., *Professor of Mechanical Engineering*

GEORGE B. FRANKFORTER, M.A., Ph.D., *Professor of Chemistry*

EVERHART P. HARDING, M.S., Ph.D., *Assistant Professor of Chemistry*

ARTHUR EDWIN HAYNES, M.S., M.Ph., Sc.D., *Professor of Engineering Mathematics*

FREDERICK S. JONES, M.A., *Professor of Physics*

WILLIAM H. KAVANAUGH, M.E., *Professor of Experimental Engineering*

WILLIAM H. KIRCHNER, B.S., *Professor of Drawing and Descriptive Geometry*

FRANCIS P. LEAVENWORTH, M.A., *Professor of Astronomy*

JOHN G. MOORE, B.A., *Professor of German*

HENRY F. NACHTRIEB, B.S., *Professor of Animal Biology*

BURT L. NEWKIRK, Ph.D., *Assistant Professor of Mathematics and Mechanics*

EDWARD E. NICHOLSON, M.A., *Assistant Professor of Chemistry*

EDWARD VAN DYKE ROBINSON, Ph.D., *Professor of Economics*

MARIA L. SANFORD, *Professor of Rhetoric and Elocution*

FREDERICK W. SARDESON, Ph.D., *Assistant Professor of Geology*

WILLIAM A. SCHAPER, M.A., Ph.D., *Professor of Political Science*

GEORGE D. SHEPARDSON, M.A., M.E., *Professor of Electrical Engineering*

CHARLES F. SIDENER, B.S., *Professor of Chemistry*

EDWARD SIGERFOOS, Captain U. S. A., *Professor of Military Science*

FRANK W. SPRINGER, E.E., *Professor of Electrical Engineering*

FRANK F. WESBROOK, M.A., M.D., C.M., *Professor of Pathology and Bacteriology*

ANTHONY ZELENY, M.S., Ph.D., *Assistant Professor of Physics*

JOHN ZELENY, B.A., Ph.D., *Professor of Physics*

INSTRUCTORS

ALVIN S. CUTLER, C.E., *Instructor in Railway Engineering*
 T. L. HINCKLEY, B.S., *Instructor in Civil Engineering*
 OLAF HOVDA, B.S., *Instructor in Engineering Mathematics*
 HENRY J. KESNER, B.A., *Instructor in Structural Engineering*
 ALOIS F. KOVARIK, B.A., *Instructor in Physics*
 JOHN V. MARTENIS, M.E., *Instructor in Machine Design*
 PETER PETERSON, *Instructor in Foundry Practice*
 EDWARD QUIGLEY, *Instructor in Forge Work*
 WILLIAM H. RICHARDS, *Instructor in Carpentry and Pattern Work*
 NORMAN W. ROSE, M.E., *Instructor in Drawing*
 FRANK B. ROWLEY, B.S., M.E., *Instructor in Drawing*
 WILLIAM T. RYAN, E.E., *Instructor in Electrical Engineering*
 S. CARL SHIPLEY, B.S., *Instructor in Machine Work*
 C. F. SHOOP, B.S., *Instructor in Mechanical Engineering*
 HENRY UBRICH, *Instructor in Carpentry*

ASSISTANTS

HARRY W. DIXON, *Engineer*
 CARL L. HERRICK, M.E., *Assistant in Mechanical Engineering*
 L. W. MCKEEHAN, *Assistant in Drawing and Descriptive Geometry*
 FRANK L. NEMEC, *Assistant in Drawing*
 LEONARD B. SPERRY, M.E., *Assistant in Electrical Engineering*

STANDING COMMITTEES

Enrollment—PROFESSORS CONSTANT, HAYNES, SPRINGER
Curriculum—PROFESSORS EDDY, FLATHER, CONSTANT, BASS, JONES, SHEPARDSON
Degrees—PROFESSORS JONES, FLATHER, SHEPARDSON, BASS
Library—PROFESSORS EDDY, FLATHER, JONES, SHEPARDSON
Catalogue—PROFESSOR KIRCHNER
Military Affairs and Athletics—PROFESSORS BROOKE, HAYNES, SIGERFOOS
Students' Work—PROFESSORS JONES, NEWKIRK, CUTLER, SHEPARDSON, KAVANAUGH, BROOKE
Graduate Studies and Degrees—PROFESSOR EDDY
Program—PROFESSORS KIRCHNER AND BASS

Non-Resident Lecturers

CIVIL ENGINEERING

Geo. L. Wilson, Engineer, T. C. R. T. Co., Minneapolis.

L. T. Blanchard, Statistician, U. S. Reclamation Service, Washington.

Frank Nay, General Auditor, C. R. I. & P. R. R., Chicago.

J. A. L. Waddell, Consulting Engineer, Kansas City.

J. T. Fanning, Consulting Engineer, Minneapolis.

D. C. Morgan, Engineer, State Railroad and Warehouse Commission,
St. Paul.

L. R. Clausen, Superintendent, C. M. & St. P. Ry., Milwaukee.

ELECTRICAL ENGINEERING

F. A. Sager, Engineer, The Arnold Company, Chicago. "What is an Engineer-Constructor?"

C. H. Harris, Engineer, Stone & Webster Company, Minneapolis. "The Taylors Falls Hydro-Electric Development."

W. S. Hart, Erecting Engineer, Electric Storage Battery Company, Chicago. "The Installation of a Storage Battery."

Truman Hibbard, Designing Engineer, Electric Machinery Company, Minneapolis. "The Design of Electric Machinery." "The Design of a 300 Kilowatt Direct Current Generator."

A. G. Wessling, Assistant Engineer, Bullock Electric Mfg. Company, Cincinnati. "The Works and Factory Methods of the Allis-Chalmers and the Bullock Companies."

C. E. Downton, Foreman of Apprentices, Westinghouse Electric and Manufacturing Company, Pittsburg. "The Factory Post-Graduate Course."

Admission

Students proposing to enter this college must be prepared to pass examinations in *fifteen* high-school year-credits or their equivalent chosen from the following list of subjects. The first six subjects, amounting to eight year-credits, are required of all students and substitutes cannot be accepted. Of the remaining seven year-credits at least *two* year-credits must be chosen from one of the language groups. Two half year-credits are equivalent to one year-credit. The ground to be covered for each credit is given in the syllabus on page 18.

EIGHT YEAR-CREDITS REQUIRED:

- Elementary Algebra, one year
- Higher Algebra, one half year
- Plane Geometry, one year
- Solid Geometry, one half year
- English, four years
- Chemistry, one year

SEVEN YEAR-CREDITS REQUIRED FROM THIS GROUP, OF WHICH AT LEAST TWO YEAR-CREDITS SHALL BE CHOSEN FROM ONE OF THE LANGUAGE GROUPS:

Latin

- Grammar, one year
- Caesar, four books, one year
- Cicero, six orations, one year
- Vergil, six books, one year

Greek

- Grammar, one year
- Anabasis, one year

German

- Grammar, one year
- Literature, one year

French

- Grammar, one year
- Literature, one year

Spanish

- Grammar, one year
- Literature, one year

History

Ancient, to Charlemagne, one year

Modern, from Charlemagne, one year

English, one half year

Senior American, one half year

Civics, one half year

Political Economy, one half year

Physics, one year

Botany, one half or one year

Zoology, one half or one year

Astronomy, one half year

Geology, one half year

Physiography, one half year

Commercial Geography, one half or one year

Drawing, one half or one year

Shop Work, one half or one year

ENTRANCE EXAMINATIONS

I. Every applicant for admission to the freshman class, whether a graduate of a high school or not, must either,

(a) present State High School Board certificates for each of the mathematical subjects required for admission, or

(b) take the entrance examinations in said subjects at the University.

No applicant will be admitted who fails to obtain credit in one of these two ways in all of the mathematical subjects required for admission.

Students proposing to enter this college should be thoroughly prepared in mathematics, since the prosecution of the work depends so largely upon the preliminary training in this subject.

II. Graduates of Minnesota State high schools; of advanced courses of Minnesota normal schools; or of Minnesota high schools or academies not under the supervision of the State High School Board, but which are accredited by the faculty of the University, will be admitted without examination in the remaining subjects presented for entrance, provided,

(a) that the school maintain a full four year course.

(b) that the applicant present to the registrar the principal's certificate on the blank form provided by the University (see note below), showing the satisfactory completion of at least fourteen of the required fifteen year credits. Such deficiency, when not a mathematical subject, is charged against the student as an entrance condition which must be removed before he enters the sophomore class.

III. Graduates of such schools, whose principal's certificate shows them to be deficient in not more than one and one half year credits and who have made such additional preparation in one or more of these subjects as they deem necessary, may take the regular entrance examinations in such subjects to reduce their deficiency to one year credit or less. But graduates whose principal's certificate shows them to be deficient in more than one and one half year credits, even though they have made such additional preparation as they deem necessary, must take the regular entrance examinations in all subjects.

IV. Graduates from schools in any other state, accredited to the state university of that state, will be admitted on the same terms as graduates of Minnesota State high schools.

V. Applicants from schools not coming within any of the above classes must take the regular entrance examinations or present State High School Board certificates, which will be accepted in lieu of an examination in the subjects which they represent.

N. B.—Students bringing records from accredited schools are required to present them on the blank form provided for the purpose by the University. Blank forms may be obtained from the registrar. No other form of certificate will be accepted. Students who do not bring their certificates on the proper form of blank will not be allowed to register until they have secured the certificate on the required form.

N. B.—Any Minnesota high school or academy not under supervision of the State High School Board, but requiring for graduation a four years' course, exclusive of the common school branches, conforming essentially in distribution of time to the entrance requirements of at least one of the University courses, will, upon application, be inspected by a committee, and after favorable recommendation, may be accredited by the faculty in all respects as are the State high schools, provided,

(1) that the school be open to inspection at any time by the University;

(2) that it take such supplementary examinations as may be prescribed from time to time.

TIME AND PLACE OF EXAMINATIONS

Entrance examinations are held only at the beginning of the college year (Tuesday, Sept. 8th). Applicants should present themselves to the registrar who will furnish them with application blanks and directions how to proceed with these examinations and registration. Students prevented from entering at the beginning of the year may be admitted at a subsequent date when circumstances are such as to justify the action. Such students are at a great disadvantage and all students expecting to

enter the University are urged to be present at the beginning of the year.

ENTRANCE CONDITIONS

No applicant will be admitted who is deficient in more than one year credit. The deficiency becomes an entrance condition and must be made up before the student passes into the sophomore class. But no applicant will be admitted to the college with an entrance condition in mathematics.

Students are strongly advised to enter without entrance conditions if possible, since the work of the freshman year is arduous, requiring the full time and energy of students to get the greatest benefit from it. It is very important that the candidate be fully prepared in the entrance requirement in chemistry.

ADVANCED CREDIT

Advanced credit for work done in manual training in the high schools is allowed under the following conditions:

(a) The courses in drawing and shop work in the high schools must be approved by the corresponding departments in the College;

(b) Students presenting two or three year credits in wood-work from such courses will receive an advanced credit in the first semester freshman shop.

(c) Students presenting three year credits from such courses in drawing will receive an advanced credit of the second semester freshman drawing.

(d) Students presenting four year credits from such courses in shop will receive an advanced credit of the first semester freshman and one-half semester sophomore shop.

(e) Students presenting four year credits from such courses in drawing will receive an advanced credit of the first and second semester freshman drawing, not including descriptive geometry.

ADVANCED STANDING

The University accepts records from other colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in this University, subject to the approval of the department concerned. In bringing records from other institutions, the certificates must be on the official blanks of the institution granting the certificate, and should show:

1. The subject studied and ground covered.
2. The time spent upon each subject.
3. In case of laboratory subjects a concise statement of work done.
4. The result. It is sufficient to state that the subject was creditably completed.

Students who desire to obtain advanced standing must present their applications and certificates to the enrollment committee who will consult departments concerned in determining the credit to be given.

UNCLASSSED STUDENTS

Unclasssed students are permitted to pursue, under the direction of the faculty, one or two lines of study, selected from some regular course. Such students must be persons of mature years and present preparation sufficient to admit them to the freshman class. Persons of mature years who shall give satisfactory evidence of ability to do with credit the work applied for, may be admitted by vote of the faculty.

GRADUATION

Students completing the course of study to the satisfaction of the faculty of the college are entitled to receive the professional degree. Any person may undergo, at suitable times, examination in any subject, and if such person pass in all the studies and exercises of the course, he is entitled to the appropriate degree; provided, however, that at least one full year must be spent at the University before such degree shall be granted; and provided the examination in every case be held before a committee of the faculty appointed for that purpose.

THESES

Every candidate for the degree of engineer is required to prepare a thesis on some subject particularly relating to his course. The thesis must embody the results of original research made by the student himself and be creditable from a literary as well as from a technical point of view.

Theses are to be written in a clear hand, or typewritten. The subject of the thesis is required to be reported to the head of the department

in which the student is a candidate for a degree, and the work of preparation must be formally begun early in the year. During the second semester the student is expected to devote at least ten hours a week to the preparation of his thesis.

The subject of the thesis and character of the work to be done will be suggested in a large measure by the course of study pursued by the student. Great emphasis is laid upon the careful and accurate preparation of the thesis; because, more than any other work the undergraduate does, this certifies to his ability to undertake the difficult and responsible duties involved in the direction of engineering and industrial interests. The thesis must be completed and put into the hands of the faculty not later than Friday, June 5th, upon a good quality of paper, 8½ by 11 inches, leaving a margin 1½ inches wide at the left for binding and a margin about 1¼ inches wide on the other sides.

The original drawings, tracings, negatives, etc., are to be placed in the department files. Clear prints therefrom are to accompany the manuscript. The thesis shall be bound in black cloth and leather and shall be deposited in the department library.

FACULTY REGULATIONS

Registration for work. Students will not receive credit for work done in classes for which they have not been registered.

Examination for credit. Students who make up work out of class and wish to take examinations to gain credit in their University course, shall apply to the faculty for permission to take the examinations.

Reports. At the end of each semester each student shall receive a mark in each subject for which he is registered. The several marks shall be as follows: A—pass with honor; B—pass with credit; P—pass; C—conditioned; F—failed.

In determining the standing of any student in any subject, the result of his daily work in that subject shall be combined with the result of the final examination in the ratio of two to one.

Subjects to be repeated. Any student in the College of Engineering whose average for the year is below passing grade will be required on reëntering the University to pursue again all the subjects of the year in which he has not passed with credit.

Students who receive a condition or failure in work of either semester so as to make it impossible for them to continue the same line of work in the following semester, will not be allowed to elect an advanced subject in place of the one omitted, but shall be required to devote their full time to the remaining subjects of the course.

However, those students who attain an average grade of B in the

remaining subjects pursued may elect an advanced subject in the place of the one omitted.

Conditions and Failures. No student will be allowed to omit any freshman work in order to make up entrance conditions.

No student with an entrance condition will be allowed to register for any sophomore subject, nor will any student with a freshman condition or failure be allowed to register for a junior subject, nor will any student with a sophomore condition or failure be allowed to register for any senior subject.

A condition not made up before the subject is offered again becomes a failure subject to rules governing failures.

Students conditioned in the work of the first semester are given an opportunity to remove their conditions at the beginning of the first semester of the following year. Students conditioned in the work of the second semester are given an opportunity to remove their conditions at the beginning or end of the first semester of the following year, at the date regularly set by the program for such examinations, but can take no subjects which require this work as a prerequisite, until the condition has been removed. It is provided that if a student attempts to remove a condition at the first examination he will not be allowed to try the following examination, but shall be required to take the work over in class. Failures must be taken over again in class.

Dropped from Rolls. Any student receiving conditions or failures in more than fifty per cent of his work in the first semester shall be dropped from the rolls, and will not be allowed to re-enter the University until the opening of the following year.

Fees and Expenses

A registration fee of fifteen dollars per semester, payable in advance, is required of all residents of the state who register in this college. Non-residents are charged double this fee, or thirty dollars per semester. No reduction is made for late entrance or for leaving before the end of the semester. In addition to this fee students who take laboratory work are charged a sum sufficient to cover the cost of material and breakage. The fees are as follows:

FRESHMAN YEAR.

<i>First Semester.</i>	
Shop work	\$ 4.50
<i>Second Semester.</i>	
Shop work	\$ 4.50

FOR CLASSES GRADUATING IN 1909-1910-1911

SOPHOMORE YEAR.

<i>First Semester.</i>	
Shop work	\$ 7.00
Physics	3.00
Chemistry	3.00
<i>Second Semester.</i>	
Shop work	\$ 7.00
Physics	3.00

JUNIOR YEAR.

<i>First Semester.</i>	
Shop work	\$ 4.50
Materials Testing Laboratory	6.00
Electrical Laboratory	1.50
Physics	3.00
<i>Second Semester.</i>	
Shop work	\$4.50
Steam Laboratory	3.00
Hydraulic Laboratory	3.00
Fuel and Gas analysis	5.00
Electrical Laboratory	6.00

SENIOR YEAR.

<i>First Semester.</i>	
Electrical Laboratory	\$3.00
Electric Power	3.00
Experimental Laboratory	6.00
<i>Second Semester.</i>	
Electrical Laboratory	\$4.50
Electric Power	3.00
Gas Engine Laboratory	4.50

A fee of 25 cents per day is charged for each day of delayed registration.

Buildings and Equipment

As an integral part of the University of Minnesota, the College of Engineering and the Mechanic Arts enjoys the advantages of the resources of the institution to the fullest extent. In addition to the University libraries and laboratories in which engineering students receive instruction, three buildings are devoted exclusively to the work of this college. The Mechanic Arts Building is occupied by the Departments of Mathematics and Drawing and also affords temporary quarters for the Departments of Civil, Municipal and Experimental Engineering. The Mechanical Engineering Department has an entire building devoted to its special work and the Electrical Engineering Department together with the Electric Light and Power Plant occupies a third building.

At the last session of the Legislature a bill was passed appropriating \$700,000 for special University purposes. Of this, \$450,000 was designated as purchase money for additional land and \$250,000 for the erection of a main engineering building and laboratory. It is hoped that these buildings will be completed during the coming year.

For information concerning methods of work and the equipment of the various departments the following condensed statements are offered.

HYDRAULIC AND MUNICIPAL ENGINEERING

The department is provided with the usual equipment for giving instruction in class-room, laboratory, and field, including a collection of drawings, photographs and models. The Engineering Department of the State Board of Health is in a position to furnish records of existing practice in Minnesota, thus providing a means of comparing progress in Minnesota and elsewhere; facilities are also offered for the prosecution of experimental work in sanitary lines under the direction of this board. Arrangements have been made with the Engineering Department of the State Highway Commission for co-operative work.

RAILWAY ENGINEERING

The aim of this department is to give the student a thorough working knowledge of railroad work, especial emphasis being laid upon the execu-

tion of practical problems, both in the field and drafting room. The department is fully equipped with the instruments necessary for carrying on an extended railroad survey.

STRUCTURAL ENGINEERING

This department has a collection of drawings of representative structures; photographs of prominent bridges, buildings and roofs, in this country and abroad; a well selected library of the best books and specifications upon structural engineering; slide rules and calculating instruments for rapid and accurate computations; and such other instruments as will facilitate the work of design.

Laboratories. Students in civil engineering have access to the laboratories and shops of the several departments in which their work lies. The Experimental Engineering laboratory offers excellent facilities for experimental work with cement and its products. In this connection there is a large Olsen testing machine of two hundred thousand pounds capacity, with automatic and autographic attachments, extension head for columns ten feet long, and transverse arms for twenty foot beams. Additional space and equipment are provided for experimental and research work.

Library. The civil engineering library is located on the first floor of the Mechanic Arts building. It contains all of the more important books and American and foreign periodicals relating to civil engineering. There are complete sets of the leading technical journals, proceedings, and reports of state and engineering societies.

Inspection Tours. The professional work in the several departments in civil engineering is illustrated in a practical manner by frequent class visits to the many engineering works and plants in the vicinity of Minneapolis and St. Paul.

MECHANICAL ENGINEERING

The plan of instruction in this course is intended to give the student a thorough training in mathematics and the physical sciences; and in the fundamental principles of engineering.

The work is planned to make him familiar with the various applications of these principles, and with the practical details of machine construction and design.

A new building especially designed to meet the requirements of instruction in the various lines of shop work, has recently been erected and the increased facilities thus afforded for the prosecution of this work are unexcelled.

This building consists of a two-story portion, containing the ma

chine shop on the first floor and the wood shop on the second; beyond the machine shop and at a different level is the forge shop and foundry, both one story in height.

Slow burning mill construction is used throughout. This consists of brick walls and heavy timbers which, in case of fire, burn slowly and are safer than the ordinary iron and timber combination for this class of buildings.

A two-story extension has recently been added in which are located the mechanical engineering lecture and recitation rooms, drawing rooms, library and offices.

In the machine shops a three-ton crane covers a clear span of twelve feet, the entire length of the shop, thus giving ample space for erecting. This crane also serves some of the larger machine tools.

The foundry has been the subject of especial study and possesses many features of interest and value. In accordance with the best modern practice for light work the floor is of concrete, and the gangways, leading from the cupola and extending lengthwise of the room, are of heavy iron plates set in cement.

A light traveling crane is also provided for the foundry. This has a span of eighteen feet, and runs the entire length of the room.

The lighting, heating and ventilation of the building have received careful consideration. In the machine and pattern shops sixty per cent of the wall space above the benches is in glass. In the foundry and forge shop less light is allowed, since an abundant supply of overhead light is obtained from windows placed in the lantern or ventilator which extends over the roof. Pipe coils are employed in heating the building and these are placed partly on the side walls under the windows and partly overhead. Electric power is used for driving the machinery. The group system has been selected as the best adapted to the conditions, and a number of small motors are placed in the several departments; 220-volt continuous current motors are employed in connection with a three wire system of distribution, which is also used in the lighting circuit.

The machine shop contains representatives of the ordinary machine tools, gauges, and small tools usually found in a well-equipped modern plant.

The shop for pattern making and general wood work contains benches with vises and tools, lathes and lathe tools, an improved universal sawing machine, band saw, planer, and other power tools, and all hand tools used in carpentry and pattern making.

The forge shop is equipped with stationary and portable forges, a blower and exhaust fan, a one-hundred pound drop hammer, and the

The foundry contains a thirty-inch Whiting cupola, and two brass furnaces, which embody some novel features. There are two core ovens; one for ordinary work $3\frac{1}{2} \times 3\frac{1}{2} \times 5$ feet, and one $3\frac{1}{2} \times 7 \times 6$ feet for special cores which may be required. The feature of these core ovens is that the gases and products of combustion are caused to traverse suitable conduits under a plate floor and do not come into direct contact with the cores. The usual moulding tools, ladles, crucibles, and all of the tools and materials needed in moulding and casting iron, brass or white metal, are provided.

The shop work is intended, not so much to give the student skill in the manual operations of the respective crafts, as a knowledge of the methods and processes of practical construction.

The new engineering power plant is admirably equipped with apparatus which constitutes a valuable part of the laboratory equipment.

The boiler plant contains a 130-h.p. Cahall (B. & W. type) water tube boiler designed to carry a working pressure of 250 pounds; a 60x16 foot multitubular boiler which carries 175 pounds pressure; a Sorge-Cochrane purifier of 300-h.p. capacity; and a large Sturtevant fan and direct-connected engine, to be used for experiments with mechanical draft.

In the engine room there is an Allfree automatic expansion 75-h.p. engine, connected by belting to a jack shaft equipped with roller bearings. A 150-h.p. cross-compound Corliss engine especially designed for the mechanical engineering department has recently been erected and is available for experimental work.

This engine is provided with a condenser, and is arranged so that it may be run simple or compound, condensing or non-condensing, as desired. It thus constitutes a valuable part of the equipment of the experimental laboratory.

The *library* of the department contains a collection of historic and recent works, the best standard books being purchased as soon as issued. There are a number of complete files of the transactions of engineering societies and of the leading technical publications. The reading room is amply supplied with both the general mechanical and railway press.

Railway mechanical engineering. Courses have been arranged for students wishing to specialize in this subject. The various courses may be elected separately, subject to the requirements for previous preparation, to fill out the electives, or options in the regular senior year of any department.

Students planning to elect these courses are encouraged to work, under special arrangements, in railway shops during the summer vacations. This has proved its value as preparatory to the special work of the senior year. In every possible way the methods of the department

are intended to place the students in touch with the best railway work, keeping always in sight the limitations which railway experience has found financially and practically to exist.

The location of the University is particularly favorable, being between the cities of St. Paul and Minneapolis in proximity to the shops, yards and headquarters of the extensive railway systems of the Northwest, which offer exceptional facilities for the prosecution of this work. The Northwest Railway Club, meeting monthly for papers and discussions, is open for the attendance of students.

Visits of inspection. During the year numerous visits are made to the manufacturing plants of St. Paul and Minneapolis, which have proven to be of great value in supplementing the class room work.

ELECTRICAL ENGINEERING

The electrical engineering department and the University electric light and power plant are housed in a brick building of slow-burning mill construction. The part of the building devoted exclusively to the work of the electrical engineering department of instruction is eighty feet long by sixty feet wide with two stories and full basement. In the basement are electro-chemical laboratory, shop, battery room, toilet and stock rooms. On the first floor are the dynamo laboratory, high tension laboratory, research laboratories, instrument rooms and offices. On the second floor are laboratories for photometry, photography, meter and lamp testing; and rooms for recitations, draughting, library and office.

The laboratory equipment includes about forty dynamo electric machines of various types and sizes for direct and alternating currents, such as constant current and constant potential direct current generators and motors, single phase and polyphase alternators, commutating, induction and synchronous motors and rotary converters, each furnished with suitable regulating devices. A number of these machines have been equipped with special devices for experimental purposes. Lamps, rheostats, batteries, fans and brakes afford convenient and ample means for taking up the energy of dynamos and motors. To facilitate testing, there are a number of pairs of similar machines. A three-ton traveling crane facilitates handling the machines. Power is obtainable from a main shaft driven by the engines of the lighting plant, or by motors connected with the University power circuits, with a storage battery or with the circuits of The Minneapolis General Electric Company, which supplies direct current at 500 volts and alternating current at 220 volts. An excellent assortment of instruments of well known American and foreign makers is available for laboratory use. A well equipped standardizing laboratory furnished with certified standards for current,

electromotive force and resistance, allows the frequent checking of instruments, so that students may work to any desired degree of refinement. The meter and lamp testing laboratories are furnished with a wide variety of arc and incandescent lamps and meters with all necessary standards and other accessories. The electro-chemical laboratory provides facilities for the construction and testing of various cells, for electro-plating and other electrolytic processes. Alternators, rotary converters, transformers, lamps, condensers, oscillographs, special apparatus and suitable instruments afford facilities for the experimental study of alternating currents. Telephone transmitters, receivers and accessories provide for practice in assembling and testing the ordinary telephonic apparatus and circuits and for investigation. There is a variety of apparatus for special investigations.

The department library contains an excellent collection of electrical and allied works, including a full set of United States Patent Office Gazettes. New books and trade publications are being added continually. Files of twenty-two journals are nearly complete and others are being collected and bound. These, with the files in the general and other department libraries of the University, offer excellent facilities for research work. Free access is given to the private libraries and collections of the professors.

The reading room receives regularly the leading American and foreign periodicals devoted to electrical engineering and allied interests. A journal club meets for the discussion of current literature in mechanical and electrical engineering, keeping the students in touch with current progress and best modern practice, and teaching them the value of the technical press.

The collection of samples furnished by various manufacturers and dealers is a great help in exhibiting best modern practice and in teaching young engineers to appreciate the merits of different products. Samples from repair shops and elsewhere are of special value in illustrating the treatment received by apparatus in commercial use and necessity of careful design and construction.

Instruction. The course aims to give the students a knowledge of phenomena and principles and the various applications of electricity, the methods and instruments used in measuring and transforming it, and practice in the design and operation of electrical apparatus. Practice and theory are taken together as far as possible. During the junior and senior years, students have daily work with electrical instruments and apparatus, and with commercial problems. Occasional inspection tours among the extensive and varied electrical interests in Minneapolis and St. Paul furnish excellent illustration. The University electric light and

power plant, which is in the same building, affords opportunity to observe commercial conditions at close range.

All engineering students are strongly advised to spend their vacations in factories, repair shops, electric light and railway stations, etc., in order to obtain commercial experience, and appreciate the relations of their technical training and actual work.

It is the aim to train the students to be independent and efficient workers, and to adopt the methods of professional engineers. Students are required to verify the formulas used in various calculations, and are encouraged to derive their own formulas for simplifying work in special cases. At the same time they are expected to use logarithms, slide rules, tables, curves, charts, and all legitimate means for obtaining accurate results with least amount of drudgery.

The regular instructing force is supplemented by competent non-resident lecturers.

Laboratory work. In the more advanced work students are encouraged to determine for themselves as independent workers the best methods and conditions for accurate results. While the laboratory work is classified, the students are treated individually and are advanced as rapidly as their attainments warrant.

In fitting up the laboratory, care is taken to secure representative types of apparatus of commercial style and size, in order to acquaint the students with actual practice. In putting up new lines and in setting up apparatus, the students are required to work in accordance with standard practice. Each student is given a certain amount of practice in the construction of electrical apparatus.

Design. The electrical engineers have drawing and design in common with the mechanical engineers in the first three years. A large number of numerical problems are given during the course. During the junior and senior years, electro-magnets and mechanism, dynamos and motors, lines, switches, switchboards and plants are designed. Complete working drawings and specifications for some special problems are elaborated. A file of about six hundred blueprints and drawings in the department library in addition to those in other departments is available to the students.

EXPERIMENTAL ENGINEERING

The laboratory, in which the experimental research of the college is conducted, has been considerably enlarged and its equipment greatly increased. Three universal testing machines of 50,000 pounds, 100,000 pounds and 200,000 pounds capacity, and five transverse and torsion testing machines are provided for determining strength, ductility, resilience and

other characteristics of the various materials used in engineering work under the various stresses. Several forms of absorption and transmission dynamometers are available for determining the power generated by engines or other motors, or absorbed by shafting or machinery; coal and gas calorimeters for determining the heating value of fuels, and apparatus for the analysis of flue gases.

The laboratory is also provided with machines for determining the lubricating qualities of oils and the relative values of metals used for journals and bearings. In addition to the boilers in the university heating plant, there is in the laboratory a 35 horse-power boiler and a high pressure boiler capable of carrying a working pressure of 300 pounds, with the necessary gages, calorimeters, tanks and pyrometers for making complete duty trials; several automatic steam engines equipped with condensers, indicators, brakes, scales and thermometers, which are employed to determine the efficiency in the use of steam under various conditions assumed or found in actual practice, and for valve setting and indicator work.

The operation and economy of other heat engines are illustrated by an Otto gas engine of five horse-power, a White gasoline engine of eight horse-power, Rider and Ericsson hot air engines, a pulsometer, and several steam and power pumps. The laboratory also contains Pelton and Tuerk water motors, a water ram, injectors, weirs, nozzles, meters and other pieces of apparatus and instruments which an engineer is called upon to use in the course of his professional work.

A constantly increasing quantity of commercial testing is being done in connection with the regular work which brings the student into actual contact with the engineering world and affords him valuable experience and data for his future work.

LIBRARIES AND READING ROOMS

The reference libraries of the several departments are well supplied with technical literature. The civil engineering library comprises over one thousand volumes; the library of the department of mathematics and mechanics numbers eighteen hundred volumes of choice mathematical and scientific works; the departments of mechanical engineering, electrical engineering and of physics have excellent collections of standard works which number over fourteen hundred volumes; the chemistry library contains over five hundred technical works; the drawing department has a collection of two hundred volumes relating to drawing, architecture and design. The above number, upwards of four thousand

volumes, comprising many works which are the private property of professors, is accessible to the students.

In addition to the above are the libraries of the University, the City of Minneapolis, the City of St. Paul and others, containing many works of value to the engineering profession. Standard works bearing on special subjects are secured as they appear and the more important scientific and technical periodicals are secured and placed in the reading rooms maintained in connection with the several departments of the college.

Journal clubs are organized, in most of the departments, for the discussion of current technical literature, relating to the best modern practice. The students are kept in touch with the developments along engineering lines and are taught how to use the technical press.

In addition to the foregoing, the college has many periodicals donated by the societies publishing them, and others loaned by members of the faculty, who place their periodicals and professional libraries at the disposition of the students.

Courses of Study

Figures at the left indicate credit hours; figures at the right indicate the course number. Letters at the right are abbreviations for the various courses, as follows:

Animal Biology	A. B.
Astronomy	A.
Botany	B.
Chemistry	C.
Civil Engineering	C.E.
Drawing and Descriptive Geometry.....	D.
Economics	Ec.
Electrical Engineering	E.E.
English	E.
Experimental Engineering	Ex. E.
French and Spanish	F.
Geology and Mineralogy	G. M.
German Language and Literature.....	G
Mathematics and Mechanics.....	M.
Mechanical Engineering	M.E.
Military Science	M. S.
Pathology and Bacteriology.....	P. B.
Physics	P.
Political Science	P.S.

CIVIL, MECHANICAL AND ELECTRICAL ENGINEERING

FRESHMAN YEAR

5	Mathematics, M. 1, 2.	Professor Haynes, Assistant Professor Newkirk, Mr. Hovda
4	English, E. 1.	Professor Sanford, Mr. Gislason
4	Drawing, D. 1, 3, 2, 4.	Professor Kirchner, Mr. Rowley, Mr. Rose, Mr. McKeehan
3	Shop M. E. 1, 2.	Mr. Shipley, Mr. Richards, Mr. Quigley
3	Modern Language, G. 1 or 4 or F. 1, 3 or 11.	Professor Moore, Professor Benton
3	Drill, M. S. 1.	Captain Sigerfoos

CIVIL ENGINEERING

SOPHOMORE YEAR

4	Mathematics, M. 3, 4.	Professor Haynes, Professor Brooke
4	Physics, P. 5, 6.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 2.	Assistant Professor Nicholson, Mr. Frary
3	Drawing, D. 5.	Professor Kirchner, Mr. Rowley, Mr. Rose
3	Modern Language,* G. 3 or 7; or F. 2, 5 or 12.	Professor Moore, Professor Benton.
3	Geology, G. M. 1, (First semester)	Assistant Professor Sardeson
3	Astronomy, A. 1,(Second semester)	Professor Leavenworth
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR***First Semester***

3	Mathematics, M. 5.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 7.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 3.	Professor Sidener
3	Animal Biology or Botany, A. B. 1 or B. 1.	Professor Nachtrieb, Professor Clements
3	Economics, Ec. 1.	Professor Robinson, Mr. Phelan
3	Architecture, D. 6.	Professor Kirchner

Second Semester

3	Mathematics, M. 6.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 8.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Surveying, C. E. 1.	Assistant Professor Bass, Mr. Cutler
3	Animal Biology or Botany, A. B. 1 or B. 1.	Professor Nachtrieb, Professor Clements
3	Transportation, Ec. 9 A.	Professor Robinson
3	Highways, C. E. 7.	Assistant Professor Bass

SENIOR YEAR***First Semester***

4	Mechanics, M. 7.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
3	Stresses, C. E. 12.	Professor Constant, Mr. Kesner
4	Surveying, C. E. 2.	Assistant Professor Bass, Mr. Cutler, Mr. Hinckley
2	American Government, P. S. 16.	Professor Schaper, Mr. Allin
2	Experimental Laboratory Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
3	Elective.	

Second Semester

4	Mechanics, M. 8.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
3	Stresses, C. E. 13.	Professor Constant, Mr. Kesner
4	Surveying, C. E. 3.	Assistant Professor Bass, Mr. Hinck- ley
2	Engineering Law, P. S. 6.	Mr. Allin
2	Hydraulic Laboratory, Ex. E. 3.	Professor Kavanaugh, Mr. Shoop
3	Electric Power, E. E. 4.	Mr. Ryan

POST SENIOR YEAR***First Semester***

5	Structural Design, C. E. 14.	Professor Constant, Mr. Kesner
4	Hydraulic Engineering, C. E. 5.	Assistant Professor Bass Mr. Hinckley
5	Masonry, C. E. 17.	Professor Constant
6	Railway Engineering, C. E. 9.	Mr. Cutler
3	Experimental Laboratory, Ex. E. 8. or	Professor Kavanaugh
3	Water Analysis, C. 5. or	Professor Frankforter
3	Railway Engineering, C. E. 10	Mr. Cutler

*Option allowed by the Committee on Students' Work, in cases of students who have completed the modern language requirement.

Second Semester

5	Structural Design, C. E. 15.	Professor Constant, Mr. Kesner
4	Municipal Engineering, C. E. 6.	Assistant Professor Bass
3	Reinforced Concrete, C. E. 18.	Professor Constant
5	Thesis.	
4	Swing Bridges, C. E. 16.	Professor Constant
	or	
4	Bacteriology, P. B. 1.	Professor Wesbrook
	or	
4	Railway Economics, C. E. 11.	Mr. Cutler

MECHANICAL ENGINEERING

SOPHOMORE YEAR

4	Mathematics, M. 3, 4.	Professor Haynes, Professor Brooke
4	Physics, P. 5, 6.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 2.	Assistant Professor Nicholson, Mr. Frary
3	Drawing, D. 5.	Professor Kirchner, Mr. Rowley, Mr. Rose
3	Modern Language* G. 3 or 7; or F. 2, 5 or 12.	Professor Moore, Professor Benton
3	Shop, M. E. 3, 4.	Mr. Shipley, Mr. Peterson
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

3	Mathematics, M. 5, 6.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 7, 8.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 3, 6.	Professor Sidener, Assistant Pro- fessor Harding
3	Economics, Ec. 1, 9A.	Professor Robinson, Mr. Phelan
3	Mechanism and Kinematics, M. E. 11, 12.	Mr. Martenis
4	Shop, M. E. 5, 6.	Mr. Shipley

SENIOR YEAR

First Semester

4	Mechanics, M. 7.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
2	American Government, P. S. 16.	Professor Schaper, Mr. Allin
3	Stresses, C. E. 12.	Professor Constant, Mr. Kesner
5	Machine Design, M. E. 13.	Professor Flather, Mr. Martenis.
1	Boilers, M. E. 19.	Mr. Shoop
3	Electric Power, E. E. 5.	Mr. Ryan

Second Semester

4	Mechanics, M. 8.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
3	Experimental Laboratory, Ex. E. 4.	Professor Kavanaugh, Mr. Shoop
2	Engineering Law, P. S. 6.	Mr. Allin
3	Steam Engines, M. E. 20.	Professor Flather
3	Machine Design, M. E. 14.	Professor Flather, Mr. Martenis
2	Gas Engines, M. E. 21:	Mr. Shoop
3	Electric Power, E. E. 5.	Mr. Ryan

POST SENIOR YEAR

First semester.

3	Thermodynamics, M. 9.	Professor Eddy
3	Experimental Laboratory, Ex. E. 6.	Professor Kavanaugh
2	Mechanical Engineering, M. E. 22.	Professor Flather
4	Machine Design, M. E. 15.	Professor Flather
	or	
4	Railway Design, M. E. 25.	Professor Flather
3	Heating and Ventilation, M. E. 23.	Mr. Martenis
	or	
2	Railway Technology, M. E. 24.	Mr. Martenis
2	Thesis	
	or	
2	Electrical Engineering, E. E. 10.	Professor Springer
3	Elective.	

Second Semester.

5	{ 4 Turbines, M. 10, 11.	Professor Eddy
	{ 1 Specifications, M. E. 28.	Professor Flather
	or	
5	{ 3 Railway Administration, Ec. 9B.	Professor Robinson
	{ 2 Railway Mech. Eng. M. E. 26.	Professor Flather
4	Machine Design, M. E. 16.	Professor Flather
	or	
4	Railway Design, M. E. 25.	Professor Flather, Mr. Martenis
2	Mechanical Engineering, M. E. 22.	Professor Flather.
	or	
2	Locomotive Testing, M. E. 27.	Professor Flather
3	Gas Engine Laboratory, Ex. E. 9.	Professor Kavanaugh
3	Elective.	
3	Thesis.	

ELECTRICAL ENGINEERING

SOPHOMORE YEAR

4	Mathematics, M. 3, 4.	Professor Haynes, Professor Brooke
4	Physics, P. 5, 6.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Chemistry, C. 2.	Assistant Professor Nicholson, Mr. Frary
3	Drawing, D. 5.	Professor Kirchner, Mr. Rowley, Mr. Rose
3	Modern Language* G. 3 or 7; or F. 2, 5 or 12.	Professor Moore, Professor Benton.
3	Shop, M. E. 3, 4.	Mr. Shipley, Mr. Peterson
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

3	Mathematics, M. 5.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
4	Physics, P. 7.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Kinematics and Mechanism, M. E. 11.	Mr. Martenis
3	Economics, Ec. 1.	Professor Robinson, Mr. Phelan
3	Chemistry, C. 3.	Professor Sidener
4	Shop, M. E. 5.	Mr. Shipley

*Option allowed by Committee on Students' Work in cases of students who have completed the modern language requirement.

Second Semester

3	Mathematics, M. 6.	Professor Haynes, Professor Brooke, Assistant Professor Newkirk
5	Physics, P. 8, 9.	Professor Jones, Professor J. Zeleny, Assistant Professor A. Zeleny, Assistant Professor Erikson, Mr. Kovarik
3	Kinematics and Mechanism, M. E. 12.	Mr. Martenis
3	Economics, Ec. 9A.	Professor Robinson, Mr. Phelan
3	Applied Electricity, E. E. 1.	Professor Shepardson
3	Shop, M. E. 6.	Mr. Shipley

SENIOR YEAR

First Semester

4	Mechanics, M. 7.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
2	American Government, P. S. 16.	Professor Schaper, Mr. Allin
3	Electrical Machinery, E. E. 2.	Professor Springer
3	Electrical Laboratory, E. E. 17.	Professor Springer
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
5	Machine Design, M. E. 13.	Professor Flather, Mr. Martenis
1	Steam Boilers, M. E. 19.	Mr. Shoop

Second Semester

4	Mechanics, M. 8.	Professor Eddy, Professor Brooke, Assistant Professor Newkirk
2	Engineering Law, P. S. 6.	Mr. Allin
3	Stresses, C. E. 12.	Professor Constant, Mr. Kesner
2	Steam Engines, M. E. 20.	Professor Flather
3	Electrical Machinery, E. E. 2.	Professor Springer
3	Electrical Laboratory, E. E. 17.	Professor Springer
2	Experimental Laboratory, Ex. E. 2.	Professor Kavanaugh, Mr. Shoop

POST SENIOR YEAR

First Semester

2	Alternating currents, E. E. 6.	Professor Shepardson
3	Thermodynamics, M. 9.	Professor Eddy
3	Electrical Engineering Practice, 7, 8 or 9, E. E.	Professor Shepardson, Mr. Ryan
3	Electrical Laboratory, E. E. 18.	Professor Springer
3	Electrical Design, E. E. 14.	Mr. Ryan
2	Experimental Laboratory, Ex. E. 7.	Professor Kavanaugh, Mr. Shoop
2	Thesis.	Professor Shepardson
3	Elective.	

Second Semester

3	Alternating Currents, E. E. 6.	Professor Shepardson
3	Electrical Engineering Practice, 8, 10, 11, 12, E. E.	Professor Shepardson, Professor Springer, Mr. Ryan
3	Electrical Laboratory, E. E. 18.	Professor Springer
3	Electrical Design, E. E. 15.	Mr. Ryan
2	Telephony, E. E. 12. or	Professor Shepardson
2	Water Turbines, M. 10.	Professor Eddy
3	Thesis.	Professor Shepardson
3	Elective.	

ORDER OF STUDIES FOR CLASSES GRADUATING 1909-1910-1911

CIVIL ENGINEERING

SOPHOMORE YEAR

First Semester

5	Mathematics, M. 3'.	Professor Haynes, Professor Brooke
6	Physics, P. 1a.	Professor Jones
3	Technological Chemistry, C. 3.	Professor Sidener
3	Drawing, D. 5.	Professor Kirchner, Mr. Rose
4½	Topography, C. E. 2.	Assistant Professor Bass, Mr. Hinckley
3	Drill, M. S. 1.	Captain Sigerfoos

Second Semester

5	Mathematics, M. 4'.	Professor Haynes, Professor Brooke
6	Physics, P. 1b.	Professor Jones and Assistants
2	Drawing, D. 5.	Professor Kirchner, Mr. Rowley
2	Astronomy, A. 1.	Professor Leavenworth
4½	Topography, C. E. 3.	Assistant Professor Bass, Mr. Hinckley
2	Highways, C. E. 7.	Assistant Professor Bass
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

5	Mechanics, M. 7'.	Professor Eddy
3	Physics P. 2 or Elective.	Assistant Professor A. Zeleny
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
4½	Curves and Earthworks, C. E. 9.	Mr. Cutler
3	Field Work, C. E. 10.	Mr. Cutler
3	Stresses, C. E. 12.	Professor Constant, Mr. Kesner

Second Semester

5	Mechanics, M. 8'.	Professor Eddy
3	Structural Details, C. E. 13.	Mr. Kesner
3	Stresses, C. E. 12, 13.	Professor Constant, Mr. Kesner
5	Railway Engineering, C. E. 9, 10.	Mr. Cutler
3	Geology, G. M. 1.	Assistant Professor Sardeson
2	Hydraulic Laboratory, Ex. E. 3.	Professor Kavanaugh, Mr. Shoop

SENIOR YEAR

First Semester

5	Masonry, C. E. 17.	Professor Constant
2	Experimental Laboratory, Ex. E. 8.	Professor Kavanaugh
	or	
2	Railway Economics, C. E. 11.	Mr. Cutler
3	Electric Power, E. E. 4.	Mr. Ryan
5	Structural Design, C. E. 14.	Professor Constant
2	Political Science, P. S. 16.	Professor Schaper
4	Hydraulic Engineering, C. E. 5.	Assistant Professor Bass
	Thesis.	

Second Semester

5	Structural Design, C. E. 15.	Professor Constant
3	Reinforced Concrete, C. E. 18.	Professor Constant
2	Transportation, Ec. 9A.	Professor Robinson
3	Sanitary Engineering, C. E. 6.	Assistant Professor Bass, Mr. Hinckley

ORDER OF STUDIES FOR CLASSES GRADUATING 1909-1910-1911

MECHANICAL ENGINEERING

SOPHOMORE YEAR

First Semester

5	Mathematics, M. 3'.	Professor Haynes, Professor Brooke
6	Physics, P. 1a.	Professor Jones and Assistants
3	Technological Chem., C. 3.	Professor Sidener
3	Drawing, D. 5.	Professor Kirchner, Mr. Rose
4½	Shop, M. E. 2, 4.	Mr. Shipley, Mr. Quigley
3	Drill, M. S. 1.	Captain Sigerfoos

Second Semester

5	Mathematics, M. 4'.	Professor Haynes
6	Physics, P. 1b.	Professor Jones and Assistants
2	Drawing, D. 5.	Professor Kirchner, Mr. Rowley
2	Kinematic Drawing, M. E. 12.	Mr. Martenis
3	Mechanism, M. E. 11.	Mr. Martenis
4½	Shop, M. E. 2, 4.	Mr. Shipley, Mr. Quigley
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

5	Mechanics, M. 7a'.	Professor Eddy, Assistant Professor Newkirk
3	Physics, P. 2.	Assistant Professor A. Zeleny
3	Stresses, C. E. 12.	Professor Constant
4	Machine Design, M. E. 13.	Professor Flather, Mr. Martenis
2	Experimental Lab. Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
2½	Shop, M. E. 5.	Mr. Shipley
3	Electric Power, E. E. 5.	Mr. Ryan

Second Semester

5	Mechanics, M. 8'.	Professor Eddy, Assistant Professor Newkirk
3	Steam Engines, M. E. 20.	Professor Flather
4	Machine Design, M. E. 14.	Professor Flather, Mr. Martenis
2	Gas Engines and Producers, M. E. 21.	Mr. Shoop
3	Experimental Lab. Ex. E. 2, 3.	Professor Kavanaugh, Mr. Shoop
1	Steam Boilers, M. E. 19.	Mr. Shoop
3	Electric Power, E. E. 5.	Mr. Ryan

SENIOR YEAR

First Semester

3	Thermodynamics, M. 9'.	Professor Eddy
3	Water Turbines, M. 10'.	Professor Eddy
	or	
2	Railway Mech. Eng., M. E. 24.	Mr. Martenis
2	Mechanical Engineering, M. E. 22.	Professor Flather
4	Steam Engine Design, M. E. 15.	Professor Flather
	or	
4	Gas Engine Design, M. E. 15.	Professor Flather
3	Fuel and Gas Analysis, C. 6.	Assistant Professor Harding.
2	Political Science, P. S. 16.	Professor Schaper
2	Experimental Lab., Ex. E. 6.	Professor Kavanaugh
0 to 2	Elective. Subject to approval of department.	

Second Semester

2	Steam Turbines, M. 11'.	Professor Eddy
	or	
2	Railway Engineering, M. E. 25.	Professor Flather
2	Contracts and Spec., M. E. 28.	Professor Flather
2	Transportation, Ec. 9A.	Professor Robinson
4	Machine Design, M. E. 16.	Professor Flather
	or	
4	Railway Design, M. E. 25.	Professor Flather
4	Gas Engine Lab., Ex. E. 9.	Professor Kavanaugh
	2 to 4 Elective.	(As approved by Department)
3	Thesis.	

ORDER OF STUDIES FOR CLASSES GRADUATING 1909-1910-1911

ELECTRICAL ENGINEERING

SOPHOMORE YEAR.

First Semester

5	Mathematics, M. 3'.	Professor Haynes, Professor Brooke
6	Physics, P. 1a.	Professor Jones and Assistants
3	Technological Chemistry, C. 3.	Professor Sidener
3	Drawing, D. 5.	Professor Kirchner, Mr. Rose
4½	Shop, M. E. 2, 4.	Mr. Shipley, Mr. Quigley
3	Drill, M. S. 1.	Captain Sigerfoos

Second Semester

5	Mathematics, M. 4'.	Professor Haynes, Professor Brooke
6	Physics, P. 1b.	Professor Jones and Assistants
2	Applied Electricity, E. E. 1.	Professor Shepardson
4	Kinematics and Mechanism, M. E. 11, 12.	Mr. Martenis
2	Drawing, D. 5.	Professor Kirchner, Mr. Rowley
3½	Shop, M. E. 2, 4.	Mr. Shipley, Mr. Quigley
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

5	Mechanics, M. 7a'.	Professor Brooke
3	Physics, P. 2.	Assistant Professor A. Zeleny
3	Stresses, C. E. 12.	Professor Constant
2	Electrical Machinery, E. E. 2.	Professor Springer
1	Electrical Laboratory, E. E. 17.	Professor Springer.
1	Steam Boilers, M. E. 19.	Mr. Shoop
4	Machine Design, M. E. 13.	Professor Flather, Mr. Martenis
2	Experimental Laboratory, Ex. E. 1.	Professor Kavanaugh, Mr. Shoop

Second Semester

5	Mechanics, M. 8'.	Professor Brooke
3	Electrical Machinery, E. E. 2.	Professor Springer
3	Steam Engines, M. E. 20.	Professor Flather
2	Machine Design, M. E. 13.	Professor Flather, Mr. Martenis
2	Electrical Design, E. E. 14.	Mr. Ryan.
4	Electrical Laboratory, E. E. 17.	Professor Springer
2	Experimental Laboratory, Ex. E. 2.	Professor Kavanaugh, Mr. Shoop

SENIOR YEAR

First Semester

3	Thermodynamics, M. 9'.	Professor Eddy
3	Alternating currents, E. E. 6.	Professor Shepardson
2	Electrical engineering practice, E. E. 7 to 12.	Professor Shepardson, Mr. Ryan
2	Water turbines, ** M. 10'.	Professor Eddy
2	Political science, P. S. 16.	Professor Schaper
2	Electrical laboratory, E. E. 18.	Professor Springer
3	Elective.	
	Thesis.	

Second Semester

3	Alternating currents, E. E. 5.	Professor Shepardson
2	Electrical engineering practice, E. E. 9 to 12.	Professor Shepardson
2	Contracts and spec., M. E. 28.	Professor Springer, Mr. Ryan
2	Transportation, Ec. 9A.	Professor Flather
3	Electrical design, E. E. 15.	Professor Robinson
3	Electrical laboratory, E. E. 18.	Mr. Ryan
3	Elective.	Professor Springer
3	Thesis.	

MUNICIPAL ENGINEERING

SOPHOMORE YEAR

First Semester

5	Mathematics, M. 3'.	Professor Haynes, Professor Brooke
6	Physics, P. 1a.	Professor Jones
3	Quantitative Anal., C. 4.	Professor Sidener
3	Drawing, D. 5.	Professor Kirchner, Mr. Rose
4½	Topography, C. E. 2.	Assistant Professor Bass
3	Drill, M. S. 1.	Captain Sigerfoos

Second Semester

5	Mathematics, M. 4'.	Professor Haynes, Professor Brooke
6	Physics, P. 1b.	Professor Jones
2	Drawing, D. 5.	Professor Kirchner, Mr. Rowley
2	Astronomy, A. 1.	Professor Leavenworth
4½	Topography, C. E. 3.	Assistant Professor Bass, Mr. Hinckley
2	Highways, C. E. 7.	Assistant Professor Bass
3	Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

5	Mechanics, M. 7'.	Professor Eddy
3	Physics, P. 2 or Elective.	Assistant Professor A. Zeleny
2½	Curves and earthwork, C. E. 9.	Mr. Cutler
2½	Water analysis, C. 5.	Professor Frankforter
2	Experimental lab., Ex. E. 1.	Professor Kavanaugh, Mr. Shoop
3	Field work, C. E. 10.	Mr. Cutler
3	Stresses, C. E. 12.	Professor Constant, Mr. Kesner

** This course in Water Turbines is a prerequisite to the course in Steam Turbines in the second semester, and all students desiring to take the latter course should not omit Water Turbines in the first semester. Senior Mechanical Engineers wishing to take Railway Mechanical Engineering may be allowed to substitute Railway Technology for Water Turbines but may, nevertheless, elect Water Turbines in preparation for Steam Turbines as an elective in the second semester. Senior Electrical Engineers wishing to specialize in Telephone Engineering will be allowed to elect an optional course in Telephony instead of Water Turbines, but they may, nevertheless, elect Water Turbines as preparation for Steam Turbines of the second semester if they desire to take Steam Turbines as an elective.

Second Semester

5	Mechanics, M. 8'.	Professor Eddy
3	Structural Details, C. E. 12, 13.	Professor Constant, Mr. Kesner
3	Stresses, C. E. 13.	Professor Constant, Mr. Kesner
5	Railway engineering, C. E. 9, 10.	Mr. Cutler
3	Geology, G. M. 1.	Professor Sardeson
2	Hydraulic lab., Ex. E. 3.	Professor Kavanaugh, Mr. Shoop

SENIOR YEAR

First Semester

5	Masonry, C. E. 17.	Professor Constant
2	Experimental lab., Ex. E. 8.	Professor Kavanaugh
3	Electric power, E. E. 4.	Mr. Ryan.
5	Structural design, C. E. 14.	Professor Constant
2	Political science, P. S. 16.	Professor Schaper
4	Hydraulic engineering, C. E. 5.	Assistant Professor Bass

Second Semester

3	Biology, B. 2.	Assistant Professor Tilden
4	Bacteriology, P. B. 1.	Professor Westbrook
5	Sanitary engineering, C. E. 6.	Assistant Professor Bass
2	Transportation, Ec. 9A.	Professor Robinson
2	Contracts and spec., M. E. 28.	Professor Flather
3	Thesis.	

COURSE IN SCIENCE AND TECHNOLOGY

SOPHOMORE YEAR

5	Mathematics, M. 3', 4'.	Professor Haynes, Professor Brooke
3	History or Chemistry, or French or English.	
6	Physics, P. 1.	Professor Jones and assistants
4	Drawing, D. 1, 3, 2, 4.	Professor Kirchner
1	Rhetoric, E. 1.	Professor Sanford, Mr. Gislason
3	Military Drill, M. S. 1.	Captain Sigerfoos

JUNIOR YEAR

First Semester

5	Mechanics, M. 7'.	Professor Eddy
3	Physics, P. 2.	Assistant Professor Zeleny
3	Drawing, D. 5.	Professor Kirchner
4	Technical work.	
4	Elective work.	

Second Semester

5	Mechanics, M. 8'.	Professor Eddy
2	Drawing, D. 5.	Professor Kirchner
5	Technical work.	
7	Elective work.	

SENIOR YEAR

12	Elective.
8	Technical work.

Courses of Instruction

ANIMAL BIOLOGY

PROFESSOR NACHTRIEB, PROFESSOR SIGERFOOS, ASSISTANT PROFESSOR BROWN, ASSISTANT PROFESSOR DOWNEY

1. GENERAL ZOOLOGY PROFESSOR SIGERFOOS, ASSISTANT PROFESSOR BROWN, ASSISTANT PROFESSOR DOWNEY
Three credits (four hours laboratory, two lectures per week) First and second semesters

Open to juniors, C. E. course.

This course is a comprehensive study of the principles of structure, physiology and development in animals. In the laboratory a brief study of insects and the dissection of the frog are used as a practical introduction to the course. Then follows a study of cell structure and cell division; a systematic study of representatives of the chief phyla or branches of the animal kingdom; and a study of the elements of embryology as illustrated by the development of the starfish and chick. Lectures, quizzes and laboratory work. Text-book required,—Hertwig's Manual of Zoology.

ASTRONOMY

PROFESSOR LEAVENWORTH, MR. BURNS

1. PRACTICAL ASTRONOMY PROFESSOR LEAVENWORTH
Three credits (three hours per week) Second semester
Sophomore C. E. course. Preparation: course M. 3.
Spherical co-ordinates; time; latitude; longitude, and other astronomical problems. Lectures.

BOTANY

PROFESSOR CLEMENTS, ASSISTANT PROFESSOR TILDEN, ASSISTANT PROFESSOR ROSENDAHL

1. GENERAL BOTANY PROFESSOR CLEMENTS, ASSISTANT PROFESSOR TILDEN
Three credits (four hours laboratory, two lectures per week) First semester
Open to juniors, C. E. course.

A general survey of the subject, comprising laboratory study of the evolution and relationships of plants, greenhouse study of their behavior and structure, and field work in the identification and distribution of flowering plants. Lectures and quizzes, laboratory, greenhouse and field work.

2. BIOLOGY ASSISTANT PROFESSOR TILDEN
Three credits (six hours per week).
Required of seniors, municipal engineering course.
Brief course in general biology. Microscopical examination of samples of water for small plants and animals of frequent occurrence in public water supplies. Sedgwick-Rafter method.

CHEMISTRY

PROFESSOR FRANKFORTER, PROFESSOR SIDENER, ASSISTANT PROFESSOR NICHOLSON, ASSISTANT PROFESSOR HARDING, MR. FRARY

2. **QUALITATIVE ANALYSIS** **ASSISTANT PROFESSOR NICHOLSON, MR. FRARY**
 Three credits (six hours per week) **First and second semesters**
 Required of all sophomores.
 The course includes general reactions of the metals and their qualitative separation; reaction and identification of acids, followed by practical problems in qualitative analysis. Lectures and laboratory work.
3. **CHEMISTRY OF MATERIALS OF ENGINEERING** **PROFESSOR SIDENER**
 Three credits (one lecture or recitation and four hours laboratory per week) **First semester**
 Required of all juniors. Preparation: course 2.
 Includes technical analysis of materials of engineering, with special references to iron and steel. Lectures and laboratory work.
4. **VOLUMETRIC ANALYSIS** **PROFESSOR SIDENER**
 Three credits **First semester**
 Required of sophomores, municipal engineering course. Preparation: course 2.
5. **WATER ANALYSIS** **PROFESSOR FRANKFORTER**
 Three credits **First semester**
 Optional, post-senior year C. E. course.
 Sanitary chemical analysis of water. Samples collected by the students tested for nitrogen in its several conditions, chlorine, color, turbidity, hardness.
6. **FUEL AND GAS ANALYSIS** **ASSISTANT PROFESSOR HARDING**
 The work includes an exhaustive chemical examination of fuels and the common gases, with a determination of their light and heat efficiencies. Lectures and laboratory work.

CIVIL ENGINEERING**HYDRAULIC AND MUNICIPAL ENGINEERING; SURVEYING**

ASSISTANT PROFESSOR BASS, MR. HINCKLEY; MR. CUTLER

1. **SURVEYING** **ASSISTANT PROFESSOR BASS, MR. CUTLER**
 Three credits, (five hours per week) **Second semester**
 Required of juniors, C. E. course.
 Recitations, lectures and illustrative problems relating to chaining, field problems employing chain; methods of keeping field notes; determination of area—D. M. D. and rectangular coördinate method. Methods of laying out and dividing land, including the public land surveys of the United States. The care, proper use and adjustment of all instruments used are treated in field exercises. Chain, compass and transit surveys are made and circuits of level-lines run by each party. All surveys made in the field are platted and areas computed. Solution of problems and usual office reduction of all field notes.
2. **SURVEYING AND TOPOGRAPHY** **ASSISTANT PROFESSOR BASS, MR. HINCKLEY**
 Four credits, (eight hours) **First semester**
 Senior C. E. course. Preparation: course 1.
 A complete topographical survey is made and platted. The survey consists of a triangulation, followed by stadia and sketching.
3. **SURVEYING AND TOPOGRAPHY** **MR. HINCKLEY**
 Four credits, (six hours per week) **Second semester**
 Required of seniors, C. E. course.
 Hydrographic, mining and municipal surveying. Use of plane-table, barometers: aneroid and mercurial. Determination of meridian by solar observation. Computation of earthwork.

4. SURVEYING

MR. HINCKLEY

One credit, (one to two hours per week)

Elective, open to students in mechanical and electrical engineering courses.

A short course in the use, care and adjustment of surveying instruments.

5. HYDRAULIC ENGINEERING

ASSISTANT PROFESSOR BASS

Four credits, (six hours per week)

First semester

Post senior C. E. course.

Lectures and recitations followed by field problems in municipal water supply. Water power, irrigation, land drainage and river and harbor improvements.

6. MUNICIPAL ENGINEERING

ASSISTANT PROFESSOR BASS

Four credits, (six hours per week)

Second semester

Post senior C. E. course.

A continuation of course 5 in municipal water supply and sewerage. Adaptation of various structures to the solution of problems of hydraulics and public hygiene. Maintenance and operation by municipal governments. House drainage, garbage disposal, heating and ventilating of public buildings, are also reviewed.

7. HIGHWAYS AND PAVEMENTS

ASSISTANT PROFESSOR BASS

Three credits, (four to five hours per week)

Second semester

Required of juniors, C. E. course.

Lectures, recitations and field work relating to the economics, location, construction and maintenance of public highways and pavements

THESIS

ASSISTANT PROFESSOR BASS

Five credits (ten hours per week)

Second semester

Post senior year

Excellent opportunities are offered for experimental work through the connection of the department with the State Board of Health.

RAILWAY ENGINEERING

MR. CUTLER, MR. HINCKLEY

9. RAILWAY ENGINEERING

MR. CUTLER, MR. HINCKLEY

Six credits (ten hours per week)

First semester

Post senior, C. E. course.

Study of the mathematics of curves and earthwork, with application to practical problems in location and construction. Preliminary and final location survey is made of about four miles of relocation, "profiles," "mass diagrams," description of right of way, complete estimate of cost. Text books: "Railroad Curves and Earthwork," Allen; "The Railroad Spiral," Searles.

10. RAILWAY ENGINEERING

MR. CUTLER

Three credits, (six hours per week)

First semester

Post senior C. E. course. Optional.

Recitations and drawing room work relating to the design and construction of railroad buildings and structures, such as wooden trestles, coaling stations, water stations, engine houses, etc. The object is to make the student familiar with all the principal structures which come under the supervision of the maintenance-of-way department of a modern railroad. Text book, "Track and Track Work," Tratman.

11. RAILWAY ENGINEERING

MR. CUTLER

Three credits, (three hours per week)

Second semester

Post senior, C. E. course. Optional.

Recitation and lectures covering the following subjects: economics of railroad location with a critical study of train resistance, influence of grade, curvature, distance, rise and fall, signaling, yards and stations, valuation of railroad property. Textbook: "Economics of Railroad Construction," Webb.

STRUCTURAL ENGINEERING**PROFESSOR CONSTANT, MR. KESNER**

12. **STRESSES IN FRAMED STRUCTURES** **PROFESSOR CONSTANT, MR. KESNER**
 Three credits (three hours per week) **First or second semester**
 Open to senior students pursuing the course in mechanics of materials.
 Stresses in simple structures by graphic and algebraic methods. Mill building specifications and proportioning of parts. Design of roof trusses, simple beams and girders and roof truss bents. Recitations, problems and plates. Ketchum's Steel Mill Buildings. Handbooks of Steel Manufacturers.
13. **STRESSES IN FRAMED STRUCTURES** **PROFESSOR CONSTANT, MR. KESNER**
 Three credits, (three hours per week) **Second semester**
 Continuation of course 12, with special reference to stresses in bridge trusses under moving loads. Recitations, problems and plates. Burr and Falk's "Design and Construction of Metallic Bridges"; Burr and Falk's "Influence Lines."
14. **STRUCTURAL DESIGN** **PROFESSOR CONSTANT, MR. KESNER**
 Five credits (ten hours per week) **First semester**
 Post-senior. Open to students who have completed courses 12 and 13.
 Theory and design of steel structures, including mill buildings, railway and highway bridges, standpipes and towers and other problems of structural interest. Lectures, problems and design. Merriman and Jacoby's Roofs and Bridges, Part III. Standard Specifications.
15. **STRUCTURAL DESIGN** **PROFESSOR CONSTANT, MR. KESNER**
 Five credits, (ten hours per week) **Second semester**
 Post senior continuation of course 14.
 With special reference to the design of a steel railway bridge and the theory and design of steel arch bridges. Lectures, problems and designs. Merriman and Jacoby's Roofs and Bridges, Part IV.
16. **SWING BRIDGES** **PROFESSOR CONSTANT**
 Four credits, (eight hours per week) **Second semester**
 Post senior, C. E. course. Optional.
 Theory and design of swing and bascule bridges, with special attention to the design of the operating machinery. Moving structures. Lectures, problems and design. Merriman and Jacoby's Roofs and Bridges, Part IV. Reference works on machine design. Students intending to take this course are advised to elect machine design, M. E. 13, first semester, senior year.
17. **MASONRY CONSTRUCTION** **PROFESSOR CONSTANT**
 Five credits (seven hours per week) **First semester**
 Post senior, preparation: course 12.
 Foundations, design and use of cribs, cofferdams and pneumatic caissons, pressure of earth, design of retaining walls, piers, abutments, dams and chimneys. Properties of stones, bricks, cement and concrete. Recitations and lectures, three hours per week; drawing room work, four hours per week. Fowler's Deep Foundations; Taylor and Thompson's Concrete and Reinforced Concrete; Howe's Retaining Walls for Earth; and current periodical engineering literature.
18. **REINFORCED CONCRETE** **PROFESSOR CONSTANT**
 Three credits, (six hours per week) **Second semester**
 Post senior. Preparation: course 17.

DRAWING AND DESCRIPTIVE GEOMETRY

PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE, MR. MCKEEHAN, MR. NEMEC

1. **DRAWING** MR. ROSE, MR. MCKEEHAN, MR. ROWLEY
Three credits (six hours per week) First semester
Required of all freshmen, in conjunction with course 3.
The elements of general drafting. Mechanical drawing as a language. Lines, views, dimensions, standards, signs, abbreviations and explanatory notes.
Sketching, lettering, tracing and blue printing. Representation of details of machines and structures, and the interpretation of working-drawings.
2. **DRAWING** MR. ROSE, MR. MCKEEHAN, MR. ROWLEY
Two credits (four hours per week) Second semester
Required of all freshmen. Preparation: courses 1, 3.
Continuation of course 1.
3. **DESCRIPTIVE GEOMETRY** PROFESSOR KIRCHNER, MR. ROWLEY,
MR. ROSE, MR. MCKEEHAN
One credit (one hour per week) First semester
Required of all freshmen. Open to students pursuing course 1.
Central projection and special cases; principles and applications. Representation of lines, planes, and solids, and of their relations; tangencies, intersections and developments.
Recitations, lectures and the solution of problems.
4. **DESCRIPTIVE GEOMETRY** PROFESSOR KIRCHNER, MR. ROWLEY,
MR. ROSE, MR. MCKEEHAN
Two credits (two hours per week) Second semester
Required of all freshmen.
Preparation: courses 1, 3.
Continuation of course 3.
5. **DRAFTING** PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Three credits each semester (six hours per week) First and second semesters
Required of all sophomores. Preparation: courses 2, 4.
Graphics, machine drafting, structural drafting, and topography. Instruction in drafting room methods.
6. **ELEMENTS OF ARCHITECTURE** PROFESSOR KIRCHNER
Three credits First semester
Required of juniors, C. E. course. Preparation: course 5.
The orders and other fundamental forms; principles of design, the analysis of the characteristics of style, application of the elements in design.
7. **TECHNICAL DRAWING** PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
Three credits each semester (six hours per week) First and second semesters
Required of freshmen, analytical chemistry course.
Theoretical and practical graphics, the reading and making of working plans. Projection, sketching, lettering, conventions, renderings and translations.

FOR GRADUATES

8. **DESCRIPTIVE GEOMETRY AND APPLICATIONS**
9. **PROJECTIVE GEOMETRY**

ECONOMICS

PROFESSOR GRAY, PROFESSOR ROBINSON, MR. PHELAN

1. **ELEMENTS OF ECONOMICS** PROFESSOR ROBINSON, MR. PHELAN
Three credits (three hours per week) First or second semester
Required of juniors

A thorough course in the elements of economic theory, with special reference to present day economic and social problems.

McVey's, Outline and a text book, supplemented by lectures and problems, with a weekly quiz.

9. A. ECONOMICS OF TRANSPORTATION AND COMMUNICATION

PROFESSOR ROBINSON

Three credits (three hours per week)

Second semester

Required of juniors. Preparation: course 1.

A general course on the history and theory of transportation and communication, with special reference to the United States. Early routes and methods of migration and commerce. Causes determining the location of railways. Effect of steam and electricity in the consolidation of industries and of nations.

Signal systems, the post, telegraph and telephone. Parcels post and express service. Economic functions and relations of highways, interurban electric lines, steam railways, inland waterways and ocean transportation. The organization of ocean commerce.

Lectures, assigned readings and discussions.

9. B. RAILWAY ECONOMICS

PROFESSOR ROBINSON

Three credits (three hours per week)

Second semester

Required, post senior year, railway M. E. course, preparation: course 9 A.

An advanced course devoted to the study of railway problems and administration, including: (1), conditions affecting economy of operation; (2), passenger and goods traffic; (3), underlying economic principles.

ELECTRICAL ENGINEERING

PROFESSOR SHEPARDSON, PROFESSOR SPRINGER, MR. RYAN, MR. SPERRY

1. APPLIED ELECTRICITY

PROFESSOR SHEPARDSON

Three credits (three hours per week)

Second semester

Required of juniors E. E. course.

Preparation: course P. 5.

Outline of industrial uses of electricity; applications of Ohm's law; methods and calculation of wiring.

2. ELECTRICAL MACHINERY

PROFESSOR SPRINGER

Three credits (six hours per week)

First and second semesters

Preparation: courses E. E. 1, P. 5, 6, and M. 5, 6.

Electrical engineering measuring instruments and their use; units; theory of dynamo electric machinery; methods of regulation, construction and operation of generators and motors; methods of testing.

4. ELECTRIC POWER

MR. RYAN

Three credits (four hours per week)

First or second semester

Required of seniors. C. E. course and School of Mines. Preparation: courses P. 5, 6.

Elements of theory and practice of electrical measurements, wiring, dynamos, motors and electric lighting. Twenty-four lectures and recitations and forty-eight hours laboratory. Textbook: Norris, Introduction to the Study of Electrical Engineering.

5. ELECTRIC POWER

MR. RYAN

Three credits (four hours per week)

First and second semesters

Required of seniors. M. E. and Chemical courses. Preparation: courses P. 5, 6.

An elementary study of the electrical problems involved in the generation, distribution, measurement and utilization of power. Lectures, recitations and laboratory work, supplemented by numerous practical problems. Textbook: Franklin and Esty, Elements of Electrical Engineering Practice.

6. **ALTERNATING CURRENTS** PROFESSOR SHEPARDSON
 Two and three credits (two or three hours per week)
First and second semesters
 Post senior year. Preparation: courses 1, 2.
 Phenomena, measurement and use of alternating currents; theory of line, transformer, generator and motor; types of apparatus.
 Textbook: Steinmetz, Alternating Current Phenomena.
7. **ELECTRICAL ENGINEERING PRACTICE. Batteries.** MR. RYAN
 One credit (one hour per week) First semester
 Post senior year. Preparation: course 2.
 General theory of primary and secondary cells; types and methods of construction; commercial applications; operation of battery plants; construction and test of cells by students; test of a commercial plant. Textbook: Lyndon, Storage Battery Engineering.
8. **ELECTRICAL ENGINEERING PRACTICE. Lighting** PROFESSOR SHEPARDSON
 One credit (one hour per week) First semester
 Post senior year. Preparation: course 2.
 Comparison of different sources of light; photometry; physics of the arc; history, design and regulation of arc lamps; adaptation to constant current, constant potential and A. C. circuits; carbons; history, manufacture and economy of incandescent lamps; distribution of light.
9. **ELECTRICAL ENGINEERING PRACTICE. Central stations** MR. RYAN
 Two credits (two hours per week) First or second semester
 Post senior year. Preparation: courses 2, 6.
 Preliminary surveys; choice of electrical systems; load diagrams; best units of power; comparison of steam, gas and water power; location, design and erection of station buildings; boilers, engines, dynamos, storage batteries, switch board and lines; operation and regulation; maintenance of plant; emergencies; examination of stations in Minneapolis and St. Paul.
10. **ELECTRICAL ENGINEERING PRACTICE. Railways** PROFESSOR SPRINGER
 One credit (one hour per week) Second semester
 Post senior year. Preparation: course 2 or 4.
 History and development; different systems of distribution; location and calculation of feeders; line and track construction; choice of motors, trucks, generators and engines; operation and repairs. Text book: Gotshall, Electric Railway Economics.
11. **ELECTRICAL ENGINEERING PRACTICE. Transmission** PROFESSOR SHEPARDSON
 One credit (one hour per week) Second semester
 Post senior year. Preparation: courses 1, 2, 5.
 Utilization of natural forces; various methods of transmission; theory of electric motor; power distribution with constant current, constant potential and alternating systems; design of line; study of particular plants.
12. **ELECTRICAL ENGINEERING PRACTICE. Telegraph and telephone** PROFESSOR SHEPARDSON
 One or two credits (one or two hours per week) Second semester
 Post senior year. Preparation: courses 1, 5.
 Various systems and instruments used in local and long distance telegraphy and telephony; design and construction of switchboards and lines; protection from inductive and other disturbances; police, fire alarm and district messenger systems.
13. **ELECTROCHEMISTRY** PROFESSOR SHEPARDSON
 One or two credits (one or two hours per week) First or second semester
 Post senior year.
 Theoretical and experimental study of electrolytic and electro-thermal processes.

14. **ELECTRICAL DESIGN** MR. RYAN
 Three credits (six hours per week) First semester
 Post senior year. Preparation: courses P. 1, 2, E. E. 1, 2, and
 M. E. 13.
 Problems in designing circuits, electro-magnets and dynamos;
 complete working drawings and specifications to accompany
 each design.
15. **ELECTRICAL DESIGN** MR. RYAN
 Three credits (six hours per week) Second semester
 Post senior year. Preparation: courses 6, 14.
 Design of a transformer, switchboard and other problems.
16. **ELECTRICAL DESIGN** MR. RYAN
 Two credits (four hours per week) Second semester
 Post senior year. Preparation: courses 8, 14.
 Designs, specifications and estimates for an electric light or pow-
 er plant
17. **ELECTRICAL LABORATORY** PROFESSOR SPRINGER
 Three credits (six hours per week) First and second semester
 Senior year. Preparation: courses P. 5, 6, and E. E. 1, 2.
 Tracing circuits and locating faults; electrical engineering
 measurements; calibration of instruments; operation and char-
 acteristic curves of generators and motors.
18. **ELECTRICAL LABORATORY** PROFESSOR SPRINGER
 Three credits (six hours per week) First and second semesters
 Post senior year.
 Experimental study of alternating currents; regulation and effi-
 ciency tests of alternators, transformers, motors and rotaries;
 photometric tests of incandescent and arc lamps.
19. **ELECTRICAL LABORATORY** PROFESSOR SHEPARDSON, PROFESSOR SPRINGER
 One or two credits (two or four hours per week)
First or second semester
 Post senior year. Efficiency tests and special problems.
20. **ELECTRICAL ENGINEERING MEASUREMENTS** PROFESSOR SPRINGER
 Application of measurements to electrical engineering practice.
 Lectures and laboratory.
21. **PLANT OPERATION** MR. RYAN, MR. DIXON
 One credit (equivalent to two hours per week) First or second semester
 Practice in operation and care of boilers, engines, motors,
 dynamos, battery and circuits of the University lighting plant.
22. **JOURNAL READING** PROFESSOR SHEPARDSON
 One credit First and second semester
 Post senior year.
 Weekly discussion of current electrical periodicals. The class
 meets monthly with the Minnesota Section of the American
 Institute of Electrical Engineers.
23. **PRECISE ELECTRICAL ENGINEERING MEASUREMENTS** PROFESSOR SPRINGER
 Preparation: course 19.
 Lectures and laboratory work. Precise measurements of re-
 sistance, voltage, current, self-induction and capacity; stand-
 ardization of measuring instruments. Open to a limited num-
 ber subject to approval.
24. **ILLUMINATING ENGINEERING** PROFESSOR SHEPARDSON
 Lectures and laboratory work. Investigation of performance of
 electric and gas lamps, reflectors and diffusers; luminous effi-
 ciency, distribution, color characteristics, physiological phenom-
 ena, methods of determining location, kind and quantity of
 lights for obtaining desired illumination.

26. ALTERNATING CURRENT PHENOMENA

PROFESSOR SHEPARDSON

Lectures and laboratory work. Study of wave forms, transient phenomena; oscillographic investigations; tests of apparatus.

Candidates for the degree of electrical engineer are required to take courses 1, 2, 6, 14, 15, 17, 18, also 68 hours class room work selected from courses 7 to 13.

NOTE.—Electives may be chosen from any courses given in the academic or engineering colleges for which the student has sufficient preparation. Attention is called to the following as desirable for electrical engineers.

Botany—Timber and timber diseases.

Chemistry—Quantitative analysis, fuel and gas analysis, electro-chemical analysis.

Civil engineering—Short course in surveying for seniors; masonry and construction, structural details; hydraulic engineering; railway economics.

Drawing—Advanced work.

Electrical engineering—Any courses not taken as required work (except 3, 4, and 5).

Geology—Mineralogy.

Language—English, French, German, Spanish.

Mathematics—Theory of turbines, hydraulic motors and wind engines; circular, hyperbolic and elliptic functions; wave theories of light, heat and electricity; directional calculus, vector analysis, differential equations, least squares.

Mechanical engineering—Measurement of power, air compressors and motors, shop work, heating and ventilation, machine design, railway technology, experimental laboratory, gas engines and producers.

Military science.

Physics—Advanced work on special problems.

Political science and economics—Money and banking, corporation finance, public finance, accounting, industrial problems.

ENGLISH

PROFESSOR SANFORD, MR. GISLASON

1. ENGLISH

PROFESSOR SANFORD, MR. GISLASON

Four credits (four hours per week) First and second semesters
Required of all freshmen.

This course is planned with special reference to the needs of engineering students. Two hours a week will be given to the study of English composition, and two hours to the study of a general survey of English literature. Essays will be required every week.

While in the study of literature one object will be the general broadening of the mind by an acquaintance with the masterpieces of English prose and poetry, especial attention will be given to the work of those writers who have handled scientific subjects with clearness and power.

EXPERIMENTAL ENGINEERING

PROFESSOR KAVANAUGH, MR. SHOOP

1. MATERIALS TESTING LABORATORY

PROFESSOR KAVANAUGH, MR. SHOOP

Two credits (lecture and laboratory) First semester

Required of seniors. Open to those pursuing course M. 7.

Investigation of the strength and physical qualities of iron, steel, brass, copper, wood, belting, ropes, chains and cement. Supplemented by lectures on the various materials of construction and standard methods of testing.

2. **STEAM LABORATORY** PROFESSOR KAVANAUGH, MR. SHOOP
Two credits (lecture and laboratory) Second semester
Required of senior E. E. Open to those pursuing course M. E. 20.
Valve setting, indicator practice, calibration of gages, calorimetry, efficiency of screws, hoists and other machines.
3. **HYDRAULIC LABORATORY** PROFESSOR KAVANAUGH, MR. SHOOP
Two credits (lecture and laboratory) Second semester
Required of senior C. E. Open to those pursuing course M. 8
Hydraulic measurements, calibration of weirs, nozzles, orifices and meters. Tests of water motors, rams, pulsometers, steam and power pumps and other hydraulic apparatus.
4. **EXPERIMENTAL LABORATORY** PROFESSOR KAVANAUGH, MR. SHOOP
Three credits
Required of senior M. E. Open to those pursuing courses M. 8 and M. E. 20.
Special modification of courses 2 and 3.
5. **EXPERIMENTAL LABORATORY** PROFESSOR KAVANAUGH
Two credits Second semester
Required of senior miners.
Special modification of courses covering work in hydraulic measurements, gas and steam engine and boiler testing.
6. **EXPERIMENTAL LABORATORY** PROFESSOR KAVANAUGH
Three credits First semester
Required of post senior M. E.; preparation: course 4.
Calibration of dynamometers and measurement of power.
Testing lubricating value of oils. Tests of injectors and ejectors. Tests of steam-turbines, steam-engines and boilers, and complete power and lighting plants.
7. **EXPERIMENTAL LABORATORY** PROFESSOR KAVANAUGH
Two credits First semester
Required of post senior E. E. Preparation: courses, M. 8 and M. E. 20.
Hydraulic measurements. Tests of water motors, rams, steam and power pumps. Measurement of power. Tests of gas and steam engines, boilers and complete power and lighting plants.
8. **EXPERIMENTAL LABORATORY** PROFESSOR KAVANAUGH
Three credits First semester
Elective for post seniors. Preparation: course 1. Tests of the properties of cements, concrete and reinforced concrete. Strength of beams, columns, joints and framed structures.
9. **GAS ENGINE LABORATORY** PROFESSOR KAVANAUGH
Three credits Second semester
Required of post senior M. E. Preparation: courses M. E. 21 and Ex. E. 6. A continuation of course 6, also tests of gas, gasoline and hot-air engines; gas producers, air compressors, automobile and locomotive testing and special work.
10. **EXPERIMENTAL LABORATORY** PROFESSOR KAVANAUGH
Two or four credits Second semester
Elective for post seniors. Special research work and commercial tests.

FOR CLASSES GRADUATING IN 1909, 1910 and 1911.

1. **MATERIALS TESTING LABORATORY**; two credits required of juniors
First semester
2. **STEAM LABORATORY**; two credits, required of juniors, M. E. and E. E.
Second semester
3. **HYDRAULIC LABORATORY**; two credits, required of juniors M. E. and C. E.
Second semester
5. **EXPERIMENTAL LABORATORY**; two credits, required of senior miners.
Second semester
6. **EXPERIMENTAL LABORATORY**; three credits, required of senior M. E.
First semester

7. **EXPERIMENTAL LABORATORY**; three credits required of senior E. E. First semester
 8. **EXPERIMENTAL LABORATORY**; two credits (elective), First semester
 9. **GAS ENGINE LABORATORY**; four credits required of senior M. E. Second semester
 10. **EXPERIMENTAL LABORATORY**; two or four credits (elective) Second semester
- Description and prerequisites of the above courses as previously stated.

FRENCH AND SPANISH

PROFESSOR BENTON, ASSISTANT PROFESSOR ANDRIST, ASSISTANT PROFESSOR FRELIN, MR. MELOM

1. **BEGINNING** ASSISTANT PROFESSOR ANDRIST, ASSISTANT PROFESSOR FRELIN
Three credits (three hours per week) First and second semesters
Open to freshmen.
Fraser and Squair's *French Grammar and Reader*; modern texts.
2. **INTERMEDIATE FRENCH** ASSISTANT PROFESSOR FRELIN
Three credits (three hours per week) First and second semesters
Open to sophomores who have completed course 1.
Francois, *Advanced French Prose Composition*; modern texts will be read, including some of the works of Merimee, Daudet, Scribe, etc.
3. **ADVANCED FRENCH GRAMMAR AND COMPOSITION** ASSISTANT PROFESSOR ANDRIST
Three credits (three hours per week) First and second semesters
Open to all who enter the university with two years of French.
Francois' *Introduction to French Composition*; readings from modern authors, including selections from Copee, Feuillet, and Sandeau.
5. **THE CLASSICAL PERIOD OF FRENCH LITERATURE** PROFESSOR BENTON
Three credits (three hours per week) First and second semesters
Open to those who have completed course 2 or 3.
The reading of works and selections produced during the classical period of French literature, and conversations in French concerning the same. The works of Corneille, Racine, Moliere, La Fontaine, etc. Compositions.
11. **BEGINNING SPANISH** MR. MELOM
Three credits (three hours per week) First and second semesters
Monsanto and Languellier *Spanish Course-Josselyn*. Worman, First Spanish Book. Bransby's Spanish Reader.
12. **INTERMEDIATE SPANISH** MR. MELOM
Three credits (three hours per week) First and second semesters
Open to those who have completed F. 11.
First Semester; Loiseaux, Spanish Composition. Brownell, *El Payaro Verde*.
Second Semester: Gray's *Fortuna*; Alarco's *El Capitan Veneno*.

GEOLOGY AND MINERALOGY

PROFESSOR HALL, ASSISTANT PROFESSOR SARDESON

1. **GEOLOGY** ASSISTANT PROFESSOR SARDESON
Three credits (three hours per week) First semester
Required of sophomores C. E. course.
A condensed course in physical and historic geology, for civil engineers. Geodynamics, structural geology, physiography, stratigraphic and historical geology are treated of successively. Excursions to typical localities will supplement work done in the class room. Lectures and references.

GERMAN LANGUAGE AND LITERATURE

PROFESSOR MOORE, ASSISTANT PROFESSOR JUERGENSEN, MR. BURKHARD

1. BEGINNING ASSISTANT PROFESSOR JUERGENSEN, MR. BURKHARD
 Three credits (three hours per week) First and second semesters
 Open to all.
 Pronunciation, grammar, conversation and composition; selected reading in easy prose and verse.
3. SCIENTIFIC INTERMEDIATE ASSISTANT PROFESSOR JUERGENSEN
 Three credits (three hours per week) First and second semesters
 Open to all who have completed course 1. First semester: Hodge's German Science Reader (or equivalent). Second semester: Brandt and Day's German Scientific Reading. This course aims to give the student a reading knowledge of German for use in scientific studies.
4. PROSE AND POETRY PROFESSOR MOORE, ASSISTANT PROFESSOR JUERGENSEN, MR. BURKHARD
 Three credits (three hours per week) First and second semesters
 Open to all who enter the university with two years of German. First semester: Meissner's *Aus Deutschen Landen*; Goethe's *Gedichte*. Second semester: Schrakamp's *Berühmte Deutsche*; Heine's *Buch der Lieder*. Geography, history and legend. Review of German grammar throughout the year. This course may be supplemented.
7. ADVANCED SCIENTIFIC READING ASSISTANT PROFESSOR JUERGENSEN
 Three credits (three hours per week) First and second semesters
 Open to those who have taken course two, three or four. Reading of monographs and periodicals.

MATHEMATICS AND MECHANICS

PROFESSOR EDDY, PROFESSOR HAYNES, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK, MR. HOVDA

The ability to understand and apply mathematical processes readily is regarded as essential to the engineer. The aim of these courses is to cultivate this ability so far as possible. To this end special emphasis is laid upon two things: elucidation of principles and drill upon their applications, as furnishing the only sure basis for a thorough technical and professional training. Courses 1 to 8 inclusive must be taken in the order indicated, and in order to enter upon the work of any year the student must have attained a passing mark on all the required courses in preceding years.

1. HIGHER ALGEBRA AND ANALYTICAL TRIGONOMETRY PROFESSOR HAYNES, ASSISTANT PROFESSOR NEWKIRK, MR. HOVDA
 Five credits (five hours per week) First semester
 Required of all freshmen. Theory of exponents, series, undetermined coefficients, determinants, theory of equations, graphs, logarithms, trigonometric transformations.
2. PLANE AND SPHERICAL TRIGONOMETRY AND ANALYTICAL GEOMETRY TO CONIC SECTIONS PROFESSOR HAYNES, ASSISTANT PROFESSOR NEWKIRK, MR. HOVDA
 Five credits (five hours per week) Second semester
 Required of all freshmen. Properties of plane triangles and their solution by logarithmic tables and the slide rule; general properties and solution of spherical triangles; introduction to analytical geometry, transformation of co-ordinates, the right line and circle.
3. ANALYTICAL GEOMETRY OF TWO AND THREE DIMENSIONS PROFESSOR HAYNES, PROFESSOR BROOKE
 Four credits (four hours per week) First semester
 Required of all sophomores. Conic sections and other loci; the

4. **DIFFERENTIAL AND INTEGRAL CALCULLUS** PROFESSOR HAYNES,
PROFESSOR BROOKE
Four credits (four hours per week) Second semester
Required of all sophomores. Differentiation and integration, expansion in series, maxima and minima, differential properties of curves and surfaces, indeterminate forms, evolutes and envelopes, curve tracing.
5. **CALCULUS AND MECHANICS** PROFESSOR HAYNES, PROFESSOR BROOKE,
ASSISTANT PROFESSOR NEWKIRK
Three credits (three hours per week) First semester
Required of all juniors. Integration; rectification, quadrature, cubature, mean value, center of pressure, center of gravity, moments of inertia, differential equations of motion, linear differential equations.
6. **ANALYTICAL MECHANICS** PROFESSOR HAYNES, PROFESSOR BROOKE,
ASSISTANT PROFESSOR NEWKIRK
Three credits (three hours per week) Second semester
Required of all juniors. Before registration for this course the student must pass the required physics of sophomore year in addition to the required mathematics, courses 1 to 5 inclusive. Statics and dynamics, rectilinear, circular and harmonic motion, and curvilinear motion in general, dynamics of rigid bodies, impact, work and energy.
7. **STRENGTH AND RESISTANCE OF MATERIALS** PROFESSOR EDDY,
PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK
Prerequisite, course 6.
Four credits (four times per week) First semester
Required of all seniors. Mechanical and elastic properties of materials of construction; beams, shafts, columns, reinforced concrete, hollow cylinders and spheres, rollers, plates; theory of internal stress.
8. **HYDRAULICS AND PUMPING MACHINERY** PROFESSOR EDDY,
PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK
Prerequisite, course 6.
Four credits (four times per week) Second semester
Required of all seniors. Laws of equilibrium, pressure and flow of liquids; theory of the action of pumps.
9. **THERMODYNAMICS OF STEAM AND GAS ENGINES** PROFESSOR EDDY
Three credits (three times per week) First semester
Required of all candidates for degrees in mechanical and electrical engineering. Prerequisite, course 8. The mechanical theory of heat as applied to steam, oil, gas and hot air engines and to compressors including use of steam tables, entropy diagrams, etc.
10. **WATER TURBINES** PROFESSOR EDDY
Two credits (two times per week) Second semester
Required of all candidates for degrees in mechanical and electrical engineering except those who elect either railway engineering or telephony. Theory of the operation, construction and regulation of turbine wheels.
11. **STEAM TURBINES** PROFESSOR EDDY
Two credits (two times per week) Second semester
Open to all who have had course 9 and are pursuing course 10. Various types of turbines, velocity, impulse, and reaction; nozzles, vanes, discs, bearings, governors, thermodynamic analysis and efficiency.
12. **REFRIGERATING MACHINERY** PROFESSOR EDDY
Two credits (two hours per week) Second semester
Open to those who have had course 10. The course will be given when a sufficient number apply.
Ammonia compression and absorption machines, compressed air

FOR GRADUATES

Courses in the following related subjects in mathematics, mathematical physics and theoretical mechanics are open to those who have had sufficient preparation, but they are primarily intended for graduates.

13. Differential Equations
14. Analytical Statics and Potential Functions
15. Spherical Harmonics
16. Theory of Electricity and Magnetism
17. Analytical Theory of the Conduction of Heat
18. Theory of Elasticity and Sound
19. Electro-magnetic Theory of Light
20. Hydrodynamics and Fluid Motion
21. Dynamics of Rigid Bodies
22. Elliptic Functions
23. Theory of Functions of the Complex Variable
24. Directional Calculus, Vector Analysis, Determinants
25. Kinetic Theory of Gases

FOR CLASSES GRADUATING 1909, 1910, 1911

- 3'. **ANALYTICAL GEOMETRY AND ELEMENTARY CALCULUS** PROFESSOR HAYNES, PROFESSOR BROOKE
 Five credits, (five hours per week) First semester
 Required of all sophomores. Conic sections and other loci; analytical geometry of three dimensions, including the point, straight line and plane and the quadric; differentiation and integration.
- 4'. **CALCULUS** PROFESSOR HAYNES, PROFESSOR BROOKE
 Five credits (five hours per week) Second semester
 Required of all sophomores. Differential coefficients, expansions in series, maxima and minima, differential properties of curves and surfaces, indeterminate forms, evolutes and envelopes, curve tracing, rectification, quadrature, cubature, center of gravity, center of pressure, moment of inertia.
- 7'. **STRENGTH AND RESISTANCE OF MATERIALS** PROFESSOR EDDY
 Five credits, (five hours per week) First semester
 Required of all juniors in the civil engineering course. Before registration for this course the student must pass the required physics of sophomore year in addition to the required mathematics of the two preceding years. Bars, beams, shafts, columns, reinforced concrete, hollow cylinders and spheres, rollers and plates and the general theory of internal stress.
- 7a'. **APPLIED MECHANICS** PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK
 Five credits, (five hours per week) First semester
 Required of all juniors in the mechanical and electrical engineering courses. Prerequisites the same as course 7'. The principles of statics and dynamics, and the mechanics of the materials of construction.
- 8'. **HYDRAULICS AND PUMPING MACHINERY** PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK
 Five credits (five hours per week) Second semester
 Required of all juniors. Prerequisite course 7' or 7a'. Laws of the equilibrium, pressure and flow of liquids; theory of the action of pumps, compression and flow of gases.
- 9'. **THERMODYNAMICS OF STEAM AND GAS ENGINES** PROFESSOR EDDY
 Three credits (three hours per week) First semester
 Required of all candidates for degrees in mechanical and electrical engineering. Prerequisite, course 8'. The mechanical theory of heat as applied to steam, oil, gas and hot air engines and to compressors, including the use of steam tables, entropy diagrams, etc.

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| <p>10'. WATER TURBINES
 Two credits, (two hours per week)
 Required of all candidates for degrees in mechanical and electrical engineering, except those who elect either railway engineering or telephony. Theory of the operation, construction and regulation of turbine wheels.</p> | <p>PROFESSOR EDDY
 First semester</p> |
| <p>11'. STEAM TURBINES
 Two credits (two hours per week)
 Open to all who have had courses 9' and 10'. Various types of turbines, velocity, impulse and reaction; nozzles, vanes, discs, bearings, governors, thermodynamic analysis and efficiency.</p> | <p>PROFESSOR EDDY
 First semester</p> |
| <p>12'. REFRIGERATING MACHINERY
 Two credits (two hours per week)
 As previously stated.</p> | <p>PROFESSOR EDDY
 Second semester</p> |

MECHANICAL ENGINEERING

PROFESSOR FLATHER, MR. MARTENIS, MR. SHOOP, MR. SHIPLEY,
 MR. RICHARDS, MR. PETERSON, MR. QUIGLEY, MR. HERRICK

SHOP WORK

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| <p>1. CARPENTRY AND PATTERN MAKING
 Four credits (six hours per week, twenty-four weeks)
 Required of all freshmen.
 Wood working, use of tools; lathe and bench work. Patterns for moulding, core boxes, flasks. Lectures and practice.</p> | <p>MR. RICHARDS
 First and second semester</p> |
| <p>2. BLACKSMITHING
 Two credits (six hours per week, twelve weeks)
 Required of all freshmen.
 Use of tools, forging, welding, tool dressing, tempering. Lectures and practice.</p> | <p>MR. SHIPLEY AND MR. QUIGLEY
 First or second semester</p> |
| <p>3. FOUNDRY PRACTICE
 Three credits (six hours per week)
 Required of all M. E. and E. E. sophomores.
 Moulding, casting, mixing metals, brass work and core making.
 Shop practice, recitations and lectures.</p> | <p>MR. PETERSON
 First or second semester</p> |
| <p>4. MACHINE AND BENCH WORK
 Three credits (six hours per week)
 Required of all M. E. and E. E. sophomores.
 Chipping, filing, machine work. Lectures and practice.</p> | <p>MR. SHIPLEY
 First or second semester</p> |
| <p>5. TOOL CONSTRUCTION
 Four credits (eight hours per week)
 Required of juniors, M. E. course. Preparation: course 5.
 Tools, taps, reamers, cutters and other special work. Lectures and practice.</p> | <p>MR. SHIPLEY
 First semester</p> |
| <p>6. MACHINE CONSTRUCTION
 Four credits (eight hours per week)
 Required of juniors, M. E. course. Preparation: course 5.
 Gear cutting, finishing, machine construction. Lectures and practice.</p> | <p>MR. SHIPLEY
 Second semester</p> |
| <p>7. CARPENTRY, JOINERY AND WOOD CARVING
 Four credits (eight hours per week)
 Open to all students.
 A course in wood working designed with special reference to the needs of teachers of manual training.</p> | <p>MR. RICHARDS
 First or second semester</p> |
| <p>8. MACHINE CONSTRUCTION
 Four credits (eight hours per week)
 Elective. Open to seniors.
 Construction of patterns and machine work for special apparatus or machinery designed by the students.</p> | <p>MR. SHIPLEY
 First or second semester</p> |

9. **SHOP ECONOMICS** **PROFESSOR FLATHER**
 Two credits (two hours per week) **Second semester**
 Senior elective.
 Shop and factory organization and management; cost systems.

10. **ENGINE ROOM PRACTICE** **MR. MARTENIS, MR. DIXON**
 One credit (equivalent to two hours per week) **First or second semester**
 Elective, post senior year.
 Operation and maintenance of gas producers, gas engines, boilers, engines, steam turbines and accessory apparatus. Smoke prevention.

MACHINE DESIGN

11. **PRINCIPLES OF MECHANISM** **MR. MARTENIS**
 Three credits (three hours per week, lectures and recitations) **First semester**
 Required of juniors, M. E. and E. E. courses. Preparation: course M. 4.
 The transmission of motion without consideration of the strength of parts. Gear wheels, linkages, belts, screws, epicyclic trains, parallel motions, quick-return movements.
12. **KINEMATICS AND ELEMENTARY MACHINE DESIGN** **MR. MARTENIS**
 Three credits (six hours per week) **Second semester**
 Required of juniors, M. E. and E. E. courses. Preparation: course M. 4.
 Graphical diagrams of the paths, speeds and accelerations of important mechanisms; centroids, analysis of mechanisms; construction of cams; roulettes, tooth profiles; kinematic pairs; machine parts.
13. **MACHINE DESIGN** **PROFESSOR FLATHER AND MR. MARTENIS**
 Five credits (ten hours per week) **First semester**
 Required of seniors, M. E. and E. E. courses. Open only to students pursuing course M. 7.
 Calculation and design of such machine parts as fastenings, bearings, rotating pieces, pulleys and spur gearing. Recitations, lectures and drawing-room practice.
14. **MACHINE DESIGN** **PROFESSOR FLATHER, MR. MARTENIS**
 Three credits (six hours per week) **Second semester**
 Required of seniors, M. E. course. Open only to those pursuing course 20.
 Continuation of course 13. Rope driving; bevel gears, spiral gears. Also application of graphical methods to the design of valve gears and link motions. Zeuner diagrams, indicator cards. Lectures and drawing-room practice.
15. **MACHINE DESIGN** **PROFESSOR FLATHER**
 Four credits (eight hours per week) **First semester**
 Required, post senior year, M. E. course. Preparation: courses 14, 19.
 Steam engine. Calculations and working drawings for a high speed automatic steam engine. Theoretical diagrams and determination of details.
 Gas engine. An alternative course in gas engine design is offered those who have completed course 21.
16. **MACHINE DESIGN** **PROFESSOR FLATHER**
 Four credits (eight hours per week) **Second semester**
 Required, post senior year, M. E. course. Preparation: course 13.
 Original designing, including machinery for changing size and form. Boiler design, cranes, pumping and transmission machinery and engineering appliances. Lectures, problems and drawing-room practice.

- 17. TOOL DESIGN** PROFESSOR FLATHER
 Two to four credits (four or eight hours per week)
First or second semester
 Post senior year, elective.
 Preparation: courses 6, 13.
 Design of special tools for manufacturing interchangeable parts;
 jigs and milling fixtures

- 18. ENGINEERING DESIGN** PROFESSOR FLATHER
 Two or four credits (four or eight hours per week)
First or second semester
 Elective. Preparation: courses 19, 20.
 Problems, designs and estimates for power plants, central stations and factory equipment. Selection of motive powers, relative advantages of steam and producer gas plants; choice of engines and boilers; water powers; power distribution, dynamos and motors; pumps, shafting, piping and accessory plant.

STEAM ENGINEERING AND PRIME MOVERS

- 19. STEAM BOILERS** MR. SHOOP
 One credit (one hour per week)
First semester
 Senior year. Open only to students pursuing course M. 7.
 Application of theory and practice in the design and construction of steam boilers, chimneys, boiler settings, and accessories, smoke prevention, mechanical stokers; methods of operating boilers with safety and economy.

- 20. STEAM ENGINE** PROFESSOR FLATHER
 Three credits, (three hours per week)
Second semester
 Senior year, preparation: course M. 7.
 Mechanics of the steam engine. Work in the cylinder; effect of reciprocating parts; steam distribution. Mechanism of the steam engine. A study of the details of modern steam engines. Valves and valve gears. A study of the slide valve, link motions, and other reversing gear; automatic cut-off gears and the Zeuner diagram. The steam engine indicator. Principles and operation of the instrument, indicator rigging; indicator cards; compounding.

- 21. GAS ENGINES AND PRODUCERS** MR. SHOOP
 Two credits, (two hours per week)
Second semester
 Senior year. Open only to students pursuing course C. 6.
 Principles of operation of two cycle and four cycle engines; cylinder construction and arrangement; valve gears and starting mechanisms; system of speed control, ignition and cooling. Application of the indicator and consideration of indicator diagrams.
 A study of the power gas producer including suction and pressure types for various fuels; construction and operation of the generator and accessory apparatus. Application to various industrial purposes. Recitations and lectures.

- 22. MECHANICAL ENGINEERING** PROFESSOR FLATHER
 Two credits (two hours per week)
First semester
 Post senior. Preparation: course M. 8.
 Measurement of power. A study of the methods employed in measuring power. Dynamometers. Prony brakes; measurement of water power; water meters; weir measurement, flow of water in pipes; measurement of electric power, efficiency of motors, power required to drive machine tools and shafting. Recitations and lectures.
 Two credits (two hours per week) Second semester
 Elective, post-senior. Preparation: course M. 8.
 Air compressors and motors, and the transmission of power by compressed air. Recitations and lectures.

23. MECHANICAL ENGINEERING**MR. MARTENIS**
First semester

Three credits (six hours per week)

Elective. Post senior year.

Heating and ventilation. Principles of heating and ventilation.

Construction and operation of heating apparatus. Steam, hot water, exhaust, vacuum and fan systems. Lectures, recitations and design.

Seminar. Open to seniors and post seniors once a week.

RAILWAY MECHANICAL ENGINEERING

The following courses are available to students desiring to prepare themselves for special work in railway engineering.

24. RAILWAY TECHNOLOGY**MR. MARTENIS**
First semester

Two credits (four hours per week)

Post senior. Railway M. E. course.

The object of this course is to familiarize the student with the principal details of construction of locomotives, and consists in part of a systematic course of visits to the various railroad shops in the vicinity; lectures and recitations.

25. RAILWAY DESIGN**PROFESSOR FLATHER**
First and second semesters

Four credits (eight hours per week)

Post senior. Preparation: course 24.

(a) Of link and valve motions. Continuation of course 12 with special applications of the Stephenson link.

(b) Of locomotive and car details.

(c) Of the locomotive boiler.

(d) Of assembled parts.

26. LOCOMOTIVE CONSTRUCTION**PROFESSOR FLATHER**
Second semester

Two credits (two hours per week)

Post senior. Preparation: course 24.

Lectures, reading and recitations on design and construction of locomotives, supplementing course 24. This treats

(a) Of parts not involving the boiler and the use of steam; but including the carriage, as frames, springs and equalizing arrangements, running gear, brakes, trucks, lubrication.

(b) Of locomotive boilers and connected parts. Types, proportions, grates, flues, smoke-box arrangements and stacks, riveted joints, bracing and staying. Lagging, smoke prevention.

(c) Of the locomotive engine. Details, heat insulation, cylinder proportion for various types, weight on drivers, special service; crank effort diagrams with inertia of reciprocating parts, cylinder and receiver ratios for compound engines, starting valves for compounds.

27. LOCOMOTIVE ROAD TESTING**PROFESSOR FLATHER**
Second semester

Post senior.

28. SPECIFICATIONS**PROFESSOR FLATHER**
Second semester

One credit (one hour per week)

Post senior year, M. E. course.

A study of engineering specifications. Classes of specifications; essential features; clauses; details. Examples. Lectures, recitations and practice in writing specifications.

FOR GRADUATES

Courses are offered in:

Engineering design.

Experimental investigation.

Railway engineering.

MILITARY SCIENCE AND TACTICS

1. MILITARY DRILL

CAPTAIN SIGERFOOS

(Three hours per week)

First and second semesters

Drill is required of all men in the freshman and sophomore classes.

Freshman—Practical instruction in schools of the soldier, company and battalion; signals, ceremonies; schools of the cannoneer and battery.

Sophomore—Practical and theoretical instruction in schools of the company and battalion: advance and rear guard drill; practical and theoretical instruction in guard duty. Gallery practice. Ceremonies.

For the instruction in military drill and administration the students are organized into a corps of cadets, consisting of four battalions of infantry, a band and a platoon of artillery.

A uniform of prescribed pattern is worn by all cadets during drill.

The uniform consists of blouse, trousers and cap, modelled after the U. S. Military Academy cadet uniform, and costs in Minneapolis about \$15.

Military drill may be taken voluntarily by others outside of the freshman and sophomore classes; and to encourage this, as it is considered beneficial, not only to the individual student, but to the State generally, the extra work is encouraged by allowing a year's drill to count as a two-hour credit for one semester, but no credit will be allowed for such drill for less than one year.

2. MILITARY SCIENCE

CAPTAIN SIGERFOOS

(Two hours per week)

Second semester

Optional with seniors and juniors.

Junior, senior—Theoretical instruction—Advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records.

This work when satisfactorily completed taken in connection with the year's drill will give a four-hour credit for the semester.

Military instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor and obedience to lawful authority, as well as to familiarize students with company and battalion manœuvres, guards and the theoretical and practical use of firearms.

On graduation of each class the Commandant will report to the Adjutant General of the Army the names of the graduates who have shown special aptitude for the military service and furnish a copy thereof to the Adjutant General of the State.

The officers and non-commissioned officers are required to be good students in the other departments, soldier-like in the performance of their duties, exemplary in their general deportment and able to pass a creditable examination in drill regulations. In general, the officers are selected from the senior class; the sergeants from the junior class; and the corporals from the sophomore class.

PATHOLOGY AND BACTERIOLOGY

PROFESSOR WESBROOK, ASSISTANT PROFESSOR HILL, DR. PRATT

1. BACTERIOLOGY

PROFESSOR WESBROOK

(Four credits)

Second semester

Post senior C. E. course, optional.

Brief course in general bacteriology. Preparation of media and study of cultures, especially those of pathogenic bacteria found in water and sewage

PHYSICS

**PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT PROFESSOR A. ZELENY,
ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK**

- 5. MECHANICS OF SOLIDS AND FLUIDS** **PROFESSOR JONES, PROFESSOR
J. ZELENY, ASSISTANT PROFESSOR A. ZELENY,
ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK**

Four credits, (three recitations, one lecture or two hours laboratory)
First semester

Open to those who have completed courses M. 1, 2.

Required of sophomores.

The course consists of a thorough drill in the elementary principles of mechanics. Numerous simple problems are taken up to illustrate the principles. Laboratory work will continue through the first part of the semester and will then be replaced by experimental lectures

- 6. HEAT, MAGNETISM AND ELECTROSTATICS** **PROFESSOR JONES, PROFESSOR
J. ZELENY, ASSISTANT PROFESSOR A. ZELENY,
ASSISTANT PROFESSOR ERIKSON, MR. KOVARIK**

Four credits (one lecture, two recitations and two hours laboratory)
Second semester

Open to those who have completed course 5.

Required of sophomores.

The fundamental principles of the subjects are studied, mainly from the experimental side. The laboratory work consists of the measurement of the most important quantities involved, and the lectures aim to illustrate the various phenomena which are studied.

- 7. ELECTROKINETICS** **PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT
PROFESSOR A. ZELENY, ASSISTANT
PROFESSOR ERIKSON, MR. KOVARIK**

Four credits, (one lecture, two recitations and two hours laboratory)
First semester

Open to those who have completed course 6. Required of juniors.

A study is made of the phenomena accompanying the passage of electricity through solids, liquids and gases, and of the various laws which govern such discharges. Not only are the basic principles of electrical engineering taken up, but a brief study is made of ionization, the X-rays, radioactivity, electric waves and wireless telegraphy. Measurements of the various electrical quantities are made in the laboratory.

- 8. SOUND AND LIGHT** **PROFESSOR JONES, PROFESSOR J. ZELENY, ASSISTANT
PROFESSOR ERIKSON, MR. KOVARIK**

Four credits, (one lecture, two recitations and two hours laboratory)
Second semester

Open to those who have completed course 5. Required of juniors.

The course consists of a study of wave motion and the various phenomena of sound and light. The lectures are profusely illustrated with experiments showing the various effects studied. The laboratory work is aimed to aid the student to a better insight of some of the relations which obtain in the subjects.

- 9. ADVANCED ELECTRICAL MEASUREMENTS** **ASSISTANT PROFESSOR A. ZELENY**

One credit (two hours laboratory work) **Second semester**

Open to those who have completed course 7.

Required of juniors, E. E. course.

This course is devoted mainly to the study and measurements of capacity, inductance and magnetic induction, and gives a thorough knowledge of the accurate determination of these quantities.

FOR CLASSES GRADUATING IN 1909-1910-1911

The mathematics of the freshman year is required as preparation for all courses in this department.

1. **PHYSICS** PROFESSOR JONES AND ASSISTANTS
Six credits, (two lectures, three recitations and two hours laboratory per week) First and second semesters
(a) Mechanics, heat, and sound.
(b) Electricity, magnetism, and light.
2. **ELECTRICAL MEASUREMENTS** ASSISTANT PROFESSOR A. ZELENY
Three credits (one lecture or recitation and four hours laboratory per week) First semester
3. **ADVANCED LABORATORY WORK** PROFESSOR JOHN ZELENY
Open to those who have completed course 2.

POLITICAL SCIENCE

PROFESSOR SCHAPER, MR. ALLIN

16. **AMERICAN GOVERNMENT** PROFESSOR SCHAPER, MR. ALLIN
Two credits, (two hours per week) First semester
Required of all seniors.
An introductory course in political science. It includes a study of the organization and present workings of our national, state and local government, and serves as an introduction to course 6.
6. **ENGINEERING LAW** MR. ALLIN
Two credits (two hours per week) Second semester
Required of all seniors. Preparation: course 16.
A course in the elements of law especially designed for engineering students. It includes a study of the system of federal and state courts, the jury system, the law of contracts, corporations, partnerships and limited partnerships, administrative law, the rights and duties of citizenship and some leading features of the law of real and personal property and the law of riparian rights.

DEPARTMENT OF AGRICULTURE



THE COLLEGE OF AGRICULTURE

The College of Agriculture

FACULTY

CYRUS NORTHROP, LL. D., *President.*

E. W. RANDALL, *Dean.*

SAMUEL B. GREEN, B. S., *Professor of Horticulture and Forestry.*

HARRY SNYDER, B. S., *Professor of Agricultural Chemistry and Soils.*

T. L. HAECKER, *Professor of Dairy Husbandry and Animal Nutrition*

M. H. REYNOLDS, M. D., V. M., *Professor of Veterinary Medicine
Surgery.*

ANDREW BOSS, *Professor of Agriculture and Animal Husbandry.*

FREDERICK WASHBURN, M. A., *Professor of Entomology*

WILLIAM BOSS, *Professor of Farm Structures and Farm Mechanics.*

E. M. FREEMAN, M. S., *Professor of Vegetable Pathology and Botany*

JOHN STEWART, B.S., *Professor of Agricultural Engineering*

R. C. LANSING, M.A., *Professor of English*

D. D. MAYNE, *Principal of School of Agriculture*

JOHN A. HUMMEL, B. Agr., *Assistant Professor of Agricultural Chemistry*

C. P. BULL, B. Agr., *Assistant Professor of Agriculture.*

D. A. GAUMNITZ, M. Agr., *Assistant Professor of Animal Husbandry.*

C. C. LIPP, D.V.M., *Assistant Professor of Veterinary Medicine
Surgery*

E. G. CHEYNEY, B. S., *Assistant Professor of Forestry.*

S. B. DETWILER, B. S., *Assistant Professor of Forestry.*

EDWARD SIGERFOOS, Ph.S., *Military Instruction*

INSTRUCTORS

J. A. VYE, *Farm Accounts.*

J. M. DREW, *Blacksmithing, Poultry.*

JUNIATA SHEPPERD, M. A., *Domestic Science.*

MARGARET BLAIR, *Domestic Art.*

FANNIE C. BOUTELLE, *Domestic Economics*

MARY BULL, *Domestic Science*

A. D. WILSON, B. Agr., *Agriculture.*

LE ROY CADY, B. S. A., *Horticulture*

GRACE B. WHITRIDGE, *Physical Culture*

A. G. RUGGLES, M. A., *Entomology*.

E. C. PARKER, B. Agr., *Agriculture*.

L. B. BASSETT, *Agriculture*

A. M. BULL, *Drawing*

W. L. BEEBE, D. V. M., *Bacteriology*.

W. H. FRAZIER, B. S., *Agricultural Chemistry and Soils*

A. E. WILHOIT, M. A., *Agricultural Chemistry and Soils*

H. B. WHITE, B. S. A., *Farm Structures and Farm Mechanics*

JOSEPHINE CRAIG, *Agricultural Chemistry*

A. R. KOHLER, B. S. A., *Horticulture*

C. SCHROEDER, B. S., *Animal Husbandry*

HENRIETTA CLOPATH, *Drawing*

H. B. ROE, *Mathematics*

MARTHA B. MOORHEAD, M. D., *Lecturer in Domestic Hygiene*

General Information

REQUIREMENTS FOR ADMISSION TO ALL COURSES IN THE COLLEGE OF AGRICULTURE

Graduates of the School of Agriculture, who have completed the studies prescribed in the intermediate course or fourth year, and *graduates of approved high and normal schools*, as approved by the committee on entrance requirements and course of study, are admitted to the freshman class in the courses in the College of Agriculture; the former to Division "A," and the latter to Division "B."

Agricultural students taking courses in the College of Science, Literature, and the Arts, or in other colleges of the University, are required to conform to rules published in the bulletins of the respective colleges.

Students from other colleges and universities: Graduates from other colleges and universities may be admitted upon presentation of certificates, and will receive credit from the several professors for all work satisfactorily completed of similar character and grade to that given in this course.

Special Students: Graduates of the School of Agriculture may be admitted as special students and be allowed to pursue such studies in the course offered in the College of Agriculture as are approved by the faculty.

All students in the College of Agriculture must advise with the dean or the committee on college and graduate work concerning all electives. No student is allowed to enter any course until such course is properly entered upon the student's registration card by the registrar of the University, and no credit shall be given for subjects in which the student has not been previously registered.

REQUIREMENTS FOR GRADUATION AND DEGREES

After the completion of the prescribed course of study, including all of the required work and the requisite amount of elective work equivalent to 144 credit hours (all the work required in the Freshman B year being counted as 36 credits), together with such practical experience as may be required by the committee on college course, students in the course in agriculture will be recommended for graduation with the degree of Bachelor of Science in Agriculture and students in the course in home economics with the degree of Bachelor of Science in Home Economics.

Students in the course in Forestry after completing the prescribed course of study, equivalent to 158 credit hours, will be recommended for graduation with the degree of Bachelor of Science in Forestry.

The elective studies designed as academic are to be chosen from the printed semester programs of work offered in the colleges of Science,

Literature and the Arts; Law; Medicine; and Engineering; no student to take more than two semesters in either of the three last named colleges. The elective studies designated as agricultural are to be chosen from the printed program of work offered in the College of Agriculture.

GRADUATE WORK

Special facilities are offered to graduate students from this and other agricultural colleges who wish to become familiar with methods employed in experiment station work, and to pursue their collegiate studies further. Courses for major and minor subjects may be arranged by consulting the professors in the different divisions. Students who enter for advanced degrees, register with the committee on registration of the College of Agriculture and also within the Graduate School. They must take their major subjects in the College of Agriculture, but they may take one or both of their two minor subjects in the College of Science, Literature and the Arts or in the College of Engineering and Mechanic Arts. Graduate students registered in the Graduate School may take one or both of their minor subjects in the College of Agriculture.

I. The degree of Master of Science in Agriculture will be conferred on a bachelor of this or any other agricultural college of equal grade who, not sooner than one year after graduation, if a resident graduate student at this agricultural college, shall pass an examination in certain prescribed lines of study and present a satisfactory thesis in accordance with the requirements of the Graduate School.

II. All general regulations of the Graduate School governing candidates for the master's degree, method of selecting work, amount of work required, degree of proficiency expected, and the time and manner of conducting the examinations, apply to candidates for master's degree in the College of Agriculture.

III. The degree of Doctor of Science will be conferred by the Graduate School for study in the College of Agriculture on bachelors of this or any other agricultural college of equal grade within not less than three years after graduation therefrom under conditions prescribed by the faculty of the graduate school.

FEES

All students in the college, who are residents of the state of Minnesota, are charged an incidental fee of ten dollars a semester. Non-residents are charged double the fee required of residents of the state, twenty dollars a semester. No reduction is made for late entrance for leaving before the end of the semester. In addition to this fee, students who take work in laboratories are charged a sum sufficient to cover the cost of material and breakage.

DAILY ROUTINE

The daily session is divided into eight recitation periods of fifty minutes each, four in the morning and four in the afternoon. The morning session begins at 8:15 and closes at 11:30 o'clock. A general assembly of the faculty and students is held at 11:30 o'clock. The noon hour extends from 12:15 to 1:15 o'clock. The afternoon session begins at 1:15 o'clock and continues until 4:30. With the exception of Saturday afternoon work extends through six days of the week.

LIBRARY

The library of the College of Agriculture contains between 10,000 and 11,000 carefully selected volumes and a large number of pamphlets, bulletins, and reports which are unbound.

Each department connected with the school and college aids in bringing together all valuable material, and students will find every inducement to pursue an extended reading course in connection with their class work. The library also contains a small but well selected number of the standard works in English and American literature, and is well provided with general reference books and general technical periodicals. The card catalogue of author and subject aids greatly in the use of the books which are all classified by the Dewey Decimal Classification. Those in charge are always pleased to assist students and aim to make the library a center for all agricultural research study.

COURSE IN AGRICULTURE

The course in agriculture is designed to give the student a broad education in the sciences and arts relating to agriculture and to fit him for the work of the agricultural specialist. The physical and biological sciences are made prominent. The work in these subjects is begun in the first or second year and may be continued throughout the course. For the first two years, the lines of study are prescribed, the subjects being chosen with a view of giving a good foundation for the work which follows. For the last two years, the work is mostly elective and gives the student an opportunity to take work along certain lines for which he has a special aptitude and liking.

In the College of Agriculture a portion of the work is taken in the College of Science, Literature, and the Arts. All academic electives and the prescribed work in geology, German, French, botany, zoology, psychology, English literature, economics and education are taken in the College of Science, Literature, and the Arts. The agricultural electives and the prescribed subjects not mentioned above are taken at University Farm.

The classes in the College of Agriculture begin with the opening of the regular University year (for which see calendar).

AGRICULTURE

Equipment. The equipment for instruction in agriculture consists of the following: Special laboratories and class rooms with modern apparatus for all courses, collections of classes and varieties of all field and weed seeds; herbariums of weeds and grasses indigenous to the state; a germinating room which affords opportunity for a study of the vitality and strength of seeds; charts and models of various details of crops together with bulletins on farm management, the cost of crop production, and other pertinent topics supplement the daily lectures; machinery used on University farm and generously loaned by the firms of the Twin Cities afford valuable subjects for instruction work. The fields and plots of the Experiment grounds offer additional "laboratories" and studies for use in class work. The student's home and farm is at all times made the basis of his particular study.

The State Grain Inspection department, elevators, mills and adjoining farms of the Twin Cities and vicinity furnish a study for the merchandizing of grains and the planning of farms. An agricultural museum, now being equipped, will contain much material that will be instructive and historic, and serve to show the close relations of agriculture and the modern industries.

Standard references upon agriculture are provided for an exhaustive study of any branch of this subject and original research is a prominent factor of the agricultural course.

AGRICULTURAL CHEMISTRY AND SOILS

Nature of Courses. All students are required to take courses 1 to 5 inclusive. Courses 7 and 8 are general lecture courses required in the agricultural course. These courses can be taken either with or without the laboratory courses, Nos. 9 and 10. Course 6 is required of all students before taking any of the more advanced laboratory work.

Equipment. A special laboratory with modern apparatus for the analysis of soils, foods and agricultural products is provided. The equipment contains an experiment mill for the production of wheat flour, a Berthelot-Atwater calorimeter for the determination of the caloric value of foods, vacuum ovens, apparatus for the chemical and physical analysis of soils, an electrical apparatus for determining the resistance of soils to soluble salts, and the necessary facilities for human and animal food investigations. Special facilities are offered in soil investigations and in the analysis and testing of wheat, flour and cereal products for commercial purposes. Nutrition investigations, including the digestibility of foods, the chemical changes which take place in cooking, and the losses in the

preparation of foods form a part of the Experiment Station work. This offers an opportunity for students to study methods of investigation relating to human food problems. Laboratory practice is also offered to advanced students in the study of household problems in which chemistry is involved. Special classes are also formed for the study of dietary problems. Standard reference books and journals, including *Jahresbericht der Agrikultur Chemie*, *Comptes Rendus*, *Biedermann's Centralblatt*, *Annales de la Science Agronomique* and *Veruschs-Stationen* are provided for the advanced work in agricultural chemistry.

Fees. In all of the laboratory courses in agricultural chemistry, a fee is charged to cover the cost of material used, and breakage. The student is assigned a certain amount of apparatus and material for which he gives a receipt, and deposits \$3 with the accountant before beginning work. All apparatus returned in good condition at the close of the term is credited to the student's account upon settlement.

ANIMAL HUSBANDRY

Equipment. Representatives of some of the leading breeds of cattle, sheep and swine are kept at University farm and herds of blooded stock near the institution and the annual show of live stock at the state fair serve for extended observation of breeds and methods of management. Each year a number of experiments are under way in the feeding of these classes of animals. Breeding experiments are also undertaken with sheep and swine, and theoretical experiments with the smaller animals. Experiments in summer feeding cattle, sheep and swine wholly or in part on pasture are carried on each year. The new live stock building affords excellent accommodations for class work in stock judging.

DAIRY HUSBANDRY

Equipment. Students in the college course have the advantages of the equipment of the dairy school. The feeding and breeding experiments in the dairy division of the experiment station serve a most useful purpose in the collegiate instruction. The cordial relations existing between the department of agriculture and the other state institutions are often advantageous to college students well advanced in dairy work.

Representatives of several breeds of cattle are kept for class use. Herds in the vicinity and those shown at the state fair are useful to students in this course.

ENTOMOLOGY

Equipment. Well lighted laboratories with modern equipment are at the disposal of college students for both undergraduate and graduate

work. Instruction is further aided by an excellent series of charts and lantern slides. The department is well equipped with museum specimens convenient to the lecture room, showing not only a large series of insects injurious and otherwise, but also over 10,000 specimens, birds and other animals which have a direct bearing upon agriculture. A good museum is also a valuable auxiliary in instruction and friends of the institution are urged to contribute specimens which illustrate the animal resources of the state. Excellent facilities for the installing and caring for museums are offered.

In economic work the student is brought into direct contact with spraying apparatus and insecticides. Practical work in bee keeping is offered in our apiary, and experiments in insect life can be carried on by advanced students in the insectary at nearly all seasons of the year.

FARM STRUCTURES AND FARM MECHANICS

Lectures and practicums in designing and construction of farm houses, farm barns, silos, out-buildings and conveniences; cement floors, walls, troughs; farm water systems, wells, cisterns, tanks, house heating and plumbing systems, and in painting farm buildings.

Equipment. Students taking this subject have the advantage of many practical examples in designing and construction of farm buildings.

The buildings on the campus, such as farm house, barns, dairy buildings, greenhouses, live stock pavilion, sheep barns, swine barns, silos, the water, sewer and heating systems are available for this work.

Many new residence buildings being erected in the vicinity of the campus afford excellent opportunities for special studies in modern house construction.

The aim is to fit the student to be able to design, estimate the cost of and construct such buildings as are best adapted to meet farm conditions.

HORTICULTURE

Equipment. The work in the division of horticulture is mainly carried on at University farm. About twenty acres is here used for the field work in this line. The horticulture building furnishes excellent facilities for classroom and laboratory exercises. The special work in breeding and testing fruits is carried on at Zumbra Heights, Carver county, where one hundred acres of land is devoted to this purpose and equipped with suitable greenhouse, storage cellar, barns, etc., affording excellent facilities for this line of investigation.

The campus of the School of Agriculture is planted out with collection of trees, shrubs and herbaceous plants suitable for this section, the specimens of which are labeled with their common and botanic

names. The parks, greenhouses, orchards and nurseries of the near vicinity afford convenient and satisfactory illustrations of the best commercial methods and ornamental planting. Our facilities in this line are unexcelled perhaps by any other college in this country.

The greenhouses, laboratories and class rooms of the division of horticulture are well equipped with modern apparatus. The division library contains a large number of horticultural works and is further supplemented by a card index to all its literature.

VETERINARY MEDICINE AND SURGERY

Equipment. The veterinary building gives ample facilities for good work. The hospital furnishes cases for study and demonstration and the dissecting room affords material and opportunity for studying the digestive organs and locomotor apparatus. A large and well stocked museum contains ample material for illustration.

Instruction is given by text-books, lectures, collateral reading and by practice work. The lectures are illustrated by means of skeletons, manikins, charts and by the living animal. Anatomy of locomotion, conformation, the digestive organs, and the higher physiology of digestion are given prominence.

Infectious diseases of domestic animals are studied with reference to causes, recognition, prevention and methods of control. Certain medicines which the intelligent stockman should understand are studied with reference to uses and methods of administration.

COURSE IN FORESTRY

The course in forestry is a four years course intended to prepare men to take charge of private forest properties, for the Government Service, or for positions as teachers. It leads to the degree of Bachelor of Science in Forestry.

Although a course leading to a technical degree in a specialized science, it is nevertheless based on broad enough lines to afford a good general scientific education. The forester in his lonely life in the woods is very frequently thrown largely upon his own resources and should be capable of obtaining pleasure and interest out of all his surroundings. For this reason an attempt is made to give the student in addition to a thorough training in technical forestry, a good working knowledge of all the sciences and other lines of study which touch upon his life in any way.

Special emphasis is laid on the value of field work and excursions. Every student is required before graduation to take four weeks work in some lumber camp, so as to become familiar with common lumbering operations. There will also be excursions to near-by forests, to lumber

camps, saw mills, wood manufacturing and paper mills; to the Boom Company's work on the Mississippi river; to near-by nurseries; and it is expected that arrangements will be made which will afford an opportunity for students to visit some of the forests of Montana, Idaho and Washington at a very low rate.

Equipment. The vast lumbering operations in the northern part of the state offer the best opportunities for a study of that branch. The establishment of the Chippewa Forest Reserve and its management by the Forest Service give opportunities which few other sections possess to study the best methods of forest management. The State has twenty-one thousand acres of timber to be used as a forest and game preserve, on which student help will be largely used. Itasca State Park, 22,000 acres in extent, is used by the Forestry School as a demonstration forest and experiment station. Every student spends about twelve months in the park during his course and does practical work in all branches. The use of this park gives the Minnesota Forestry School a forest equipment which is unsurpassed anywhere.

Throughout the year, special lectures will be given by the State Forestry Commissioner, the State Game Warden, the State Fish Commissioner and prominent lumbermen and lumber manufacturers of Minneapolis and St. Paul. This touch with the commercial side of the lumber business is very important and the situation of the school makes it possible to offer a great deal of it. Other special lectures will be presented as opportunity offers.

COURSE IN HOME ECONOMICS

The work in home economics offered in the College of Agriculture is a four years course leading to the Degree of Bachelor of Science in Home Economics and is open to graduates from the School of Agriculture who have taken the work of the intermediate year, and to graduates of approved high and normal schools. It is intended to bring to the vocation of home making the same kind of help which the course in agriculture brings to the business of farming. Aside from the universal need of education of this character, there is a marked and increasing demand for trained women to fill institutional positions and administrative positions as competent supervisors of supplies and of hygiene where large numbers are cared for in collective housekeeping, as well as for special teachers in the several divisions of home economics.

NORMAL COURSE

In addition a short two years normal course is offered in home economics, which includes all the special technical subjects given in the four years

course in the College of Agriculture at the University Farm, but does not include the required general cultural studies which are given in the College of Science, Literature, and the Arts. Those who complete this course receive a certificate only.

Graduates of other reputable colleges can here secure a Bachelor's degree by devoting two years to the subject of Home Economics. The major work must be done in Home Economics and one or both of two minors must be completed under the advice of the college committee in one of the other divisions of the College of Agriculture, or in the College of Science, Literature, and the Arts. When approved by the dean and college committee, other subjects given in these colleges may be substituted for the prescribed subjects in the course in home economics.

Women who are sufficiently advanced may study music or art during the junior or senior years, provided that no student may receive more than two semesters' credit in music and art together.

OUTLINE OF COURSE IN AGRICULTURE

(Numbers after subjects indicate number of courses)

FRESHMAN YEAR

Division A.

For graduates of the School of Agriculture

First Semester

Mathematics 1, three hours, Mr. Roe

Geology 1, three hours, Professor Hall

German 1, five hours, Professor Schlenker and Assistants

Rhetoric 1, three hours, Professor Lansing

Botany 1, six hours, Professor Clements and Assistants

Second Semester

Mathematics 3, half semester, three hours, Mr. Roe

Drawing 2, half semester, four hours, Miss Clopath

German 1, five hours, Professor Schlenker and Assistants

Rhetoric 1, three hours, Professor Lansing

Botany 1, six hours, Professor Clements and Assistants

Agricultural Chemistry 4, six hours, Mr. Wilhoit

FRESHMAN YEAR

Division B

For graduates of approved High Schools or others of equal standing.

First Semester

Rhetoric 1, three hours, Professor Lansing

Farm Mechanics 1, four hours, Professor Wm. Boss and Assistants

Agricultural Chemistry 1, five hours, Professor Snyder and Assistants

Second Semester

Animal Husbandry 3, three hours, Professor A. Boss
Farm Mechanics 2, four hours, Mr. Drew
Agricultural Chemistry 2, three hours, Professor Snyder and Assistants
Animal Husbandry 2, half semester, four hours, Mr. Schroeder
Horticulture 2, half semester, three hours, Professor Green and Assistants
Animal Husbandry 4, half semester, three hours, Mr. Drew
Drawing 2, half semester, four hours, Miss Clopath
Rhetoric 1, three hours, Professor Lansing
Mathematics 3, half semester, three hours, Mr. Roe
Horticulture 3, half semester, four hours, Mr. Cady
Dairy Husbandry 2, half semester, four hours, Professor Haecker and Assistants
Military Drill, three hours, Captain Sigerfoos, U. S. A.
Gymnasium, one hour

SOPHOMORE YEAR

First Semester

Botany (B) 1, six hours, Professor Clements and Assistants
Zoology 1, six hours, Professor Sigerfoos and Assistants
German or *French* 3, three hours, Professor Schlenker and Assistants, or Professor Benton and Assistants
Agricultural Chemistry 5, six hours, Professor Snyder and Assistants
Rhetoric 2, three hours, Professor Lansing
Agricultural Physics 1, three hours, Professor Stewart
Horticulture 1, or *Animal Husbandry* 6, half semester, four hours, Professor Green, or Professor A. Boss
Military Drill (B), three hours, Captain Sigerfoos, U. S. A.

Second Semester

Botany (B) 1, six hours, Professor Clements and Assistants
Zoology 1, six hours, Professor Sigerfoos and Assistants
German or *French* 3, three hours, Professor Schlenker and Assistants, or Professor Benton and Assistants
Agricultural Chemistry 5, six hours, Professor Snyder and Assistants
Rhetoric 2, three hours, Professor Lansing
Economics 1, three hours, Professor Robinson
Agriculture 10, half semester, four hours, Professor A. Boss and Assistants
Military Drill (B), three hours, Captain Sigerfoos, U. S. A.

JUNIOR YEAR

First Semester

Agricultural Chemistry 7, three hours, Professor Snyder and Assistants
Agriculture 5, three hours, Assistant Professor Bull
Dairy Husbandry 3, three hours, Professor Haecker
Botany 3, six hours, Professor Clements and Assistants
Economics 1, three hours, Professor Robinson
Vegetable Pathology 1, six hours, Professor Freeman

Second Semester

Agricultural Chemistry 8, three hours, Professor Snyder and Assistants
Farm Structures 4, three hours, Professor Wm. Boss
Agriculture 8 and 9, three hours, Mr. Wilson and Mr. Parker
Botany 3, six hours, Professor Clements and Assistants
Economics, elective, three hours, Professor Gray and Assistants
Animal Husbandry 9, three hours, Professor A. Boss and Assistants

SENIOR YEAR

First Semester

Agriculture 4, three hours, Assistant Professor Bull
Farm Structures 5, three hours, Professor Wm. Boss
Animal Husbandry 7, three hours, Professor A. Boss and Assistants
Comparative Physiology, six hours, Professor Sigerfoos
Elective, three hours
Elective, three hours

Second Semester

Horticultural Elective, three hours, Professor Green and Assistants
Veterinary Elective, three hours, Professor Reynolds
Agricultural Elective, three hours, Professor A. Boss and Assistants
Elective, three hours
Elective, three hours
Elective, three hours

SENIOR ELECTIVES

Greenhouse Management and Floriculture, three hours, Professor Green and Assistants
Landscape Gardening, three hours, Professor Green
Plant Breeding—Horticulture, three hours, Professor Green
Plant Breeding—Agriculture, three hours, Assistant Professor Bull

Systematic Pomology, three hours, Mr. Kohler
Agricultural Engineering, three hours, Professor Stewart
Chemistry Laboratory Courses, six hours, Professor Snyder and Assistants
Economic Entomology, three hours, Professor Washburn
Comparative Anatomy and Histology of Insects, six hours, Professor Washburn and Assistants
Elements of Bee Keeping, one hour, Professor Washburn
Anatomy and Body Nutrition, three hours, Professor Reynolds
Anatomy of Conformation of Type, three hours, Professor Reynolds
Diseases of Animals, three hours, Professor Reynolds
Advanced Meats and Judging, three hours, Professor A. Boss and Assistants.
Bacteriology, one hour, Dr. Beebe
Dairy Stock and Dairy Farm Management, three hours, Professor Haecker
Factory Dairying, three hours, Professor Haecker and Assistants
Farm Accounts, four hours, Mr. Vye
Farm Machinery, three hours, Mr. Bassett
General Forestry, three hours, Assistant Professor Cheyney
Research Work—Dairy Husbandry, Agriculture, Horticulture, Animal Husbandry, Veterinary

ACADEMIC ELECTIVES

Botany	Psychology
Economics	History
Literature	Education
Geology	Rhetoric
Zoology	

OUTLINE OF COURSE IN ANIMAL HUSBANDRY

Students who wish to specialize in Animal Husbandry are recommended to arrange their courses in the junior and senior years as follows:

JUNIOR YEAR

First Semester

Zoology 2, six hours, Professor Sigerfoos and Assistants
Animal Husbandry 12, three hours, Assistant Professor Gaumnitz
Agriculture 5, three hours, Assistant Professor Bull
Economics, elective, three hours
Dairy Husbandry 2, three hours, Professor Haecker
Animal Husbandry, elective, three hours, Professor Boss and Assistant

Second Semester

Zoology 2, six hours, Professor Sigerfoos and Assistants

Animal Husbandry 8, three hours, Professor A. Boss and Assistants

Farm Structures 9, three hours, Professor Wm. Boss

Economics, elective, three hours

Animal Husbandry 10, three hours, Professor A. Boss and Assistants

Elective, three hours

SENIOR YEAR

First Semester

Farm Structures 10, three hours, Professor Wm. Boss

Comparative Physiology, six hours, Professor Sigerfoos

Animal Husbandry 7, six hours, Professor A. Boss and Assistants

Animal Husbandry 11, three hours, Professor A. Boss or Professor Haecker

Elective, three hours

Elective, three hours

Second Semester

Veterinary Elective, three hours, Professor Reynolds

Animal Husbandry 14, three hours, Professor A. Boss and Assistants

Animal Husbandry 13, three hours, Professor A. Boss

Animal Husbandry 16, three hours, Professor A. Boss

Elective, three hours

Elective, three hours

JUNIOR AND SENIOR ELECTIVES FOR ANIMAL HUSBANDRY COURSE

Anatomy, three hours, Professor Reynolds

Dissection, three hours, Professor Reynolds

Agricultural Economics, three hours, Mr. Parker

Foods, three hours, Professor Snyder

Stock Farm Management, three hours, Mr. Wilson

Animal Taxonomy, three hours, Professor Reynolds

Home Dairying, four hours, Professor Haecker

Dairy Stock and Dairy Farm Management, three hours, Professor Haecker

Diseases of Animals, three hours, Professor Reynolds

Animal Mechanics, three hours, Assistant Professor Gaumnitz

Animal By-Products, three hours, Professor A. Boss

Advanced Meats and Judging, three hours, Professor A. Boss

OUTLINE OF COURSE IN FORESTRY

(Numbers after subjects indicate number of courses).

FRESHMAN YEAR

First Semester

Mathematics 1, three hours, half semester, Mr. Roe

German or French 1, five hours, Professor Schlenker and Assistants, o
Professor Benton and Assistants

Botany 1, six hours, Professor Clements and Assistants

Geology 1, three hours, Professor Hall

Rhetoric 1, three hours, Professor Lansing

Agricultural Chemistry 1, five hours, Professor Snyder and Assistants

Forestry 1, three hours, Assistant Professor Cheyney

Military Drill, three hours, Captain Sigerfoos, U. S. A.

Second Semester

Mathematics 3, half semester, three hours, Mr. Roe

German or French 1, five hours, Professor Schlenker and Assistants, o
Professor Benton and Assistants

Botany 1, six hours, Professor Clements and Assistants

Physiography, three hours, Mr. E. M. Lehnerts

Rhetoric 1, three hours, Professor Lansing

Agricultural Chemistry 2, three hours, Professor Snyder and Assistants

Military Drill, three hours, Captain Sigerfoos, U. S. A.

SOPHOMORE YEAR

First Semester

German or French 3, three hours, Professor Schlenker and Assistants, o
Professor Benton and Assistants

Rhetoric 2, three hours, Professor Lansing

Mineralogy 1, three hours, Professor Hall and Mr. Grout

Botany 2, six hours, Professor Clements and Assistants

Zoology 1, six hours, Professor Sigerfoos and Assistants

Drawing 1, four hours, Mr. A. Bull

Agricultural Chemistry 5, six hours, Professor Snyder and Assistants

Forestry 11, one hour, Assistant Professor Detwiler

Military Drill, three hours, Captain Sigerfoos, U. S. A.

Second Semester

German or French 3, three hours, Professor Schlenker and Assistants, or
 Professor Benton and Assistants
Rhetoric 2, three hours, Professor Lansing
Forestry 24, three hours, Professor Green
Botany 2, six hours, Professor Clements and Assistants
Zoology 1, six hours, Professor Sigerfoos and Assistants
Drawing 4, six hours, Mr. A. M. Bull
Agricultural Chemistry 5, six hours, Professor Snyder and Assistants
Vegetable Pathology 2, six hours, Professor Freeman
Military Drill, three hours, Captain Sigerfoos, U. S. A.

JUNIOR YEAR

First Semester

Entomology 3, six hours, Professor Washburn
Botany 3, six hours, Professor Clements and Assistants
Agriculture 1, three hours, Assistant Professor Bull
Economics 1, three hours, Professor Robinson and Mr. Phelan
Forestry 3, three hours, Assistant Professor Detwiler
Forestry 7, three hours, Assistant Professor Cheyney

Second Semester

First Half

Animal Husbandry, Professor A. Boss and Assistants
Forestry 12, Assistant Professor Cheyney
Horticulture 3, Professor Green and Assistants
Farm Structures 3, Professor Wm. Boss
Farm Mechanics 2, Mr. Drew
Veterinary 5, Professor Reynolds
Farm Mechanics, Professor Wm. Boss
Entomology 3, Professor Washburn
Botany 3, half semester, Professor Clements and Mr. Huff
Dairy Husbandry, Professor Haecker and Assistants

Last Half at Itasca Park

April 15 to September 1.

Forestry 3, Assistant Professor Detwiler
Forestry 5, Assistant Professor Cheyney
Forestry 6, Professor Stewart
Forestry 18, Assistant Professor Detwiler
Forestry 20, Professor Stewart
Forestry 19, Assistant Professor Detwiler

SENIOR YEAR

First Semester

Forestry 10, three hours, Assistant Professor Cheyney
Forestry 9, three hours, Assistant Professor Cheyney
Vegetable Pathology 1, six hours, Professor Freeman
Agricultural Chemistry 12, three hours, Assistant Professor Hummel
Economics, elective, three hours, Professor Gray and Assistants

Second Semester

First Half

Forestry 8, Mr. Fullerton
Forestry 23, Assistant Professor Cheyney
Forestry 22, Assistant Professor Cheyney
Forestry 16, Assistant Professors Cheyney and Detwiler

Second Half at Itasca Park.

April 15 to June 1.

Forestry 17, Assistant Professor Cheyney
Forestry 4, Assistant Professor Detwiler
Forestry 15, Professor Green
Forestry 14, Professor Green
Forestry 13, Professor Stewart
Forestry 21, Professor Stewart
Forestry 24, Professor Green

OUTLINE OF COURSE IN HOME ECONOMICS

(Numbers after subjects indicate number of courses.)

FRESHMAN YEAR

Division "A"

For graduates of the School of Agriculture

First Semester

Mathematics 1, three hours, Mr. Roe
Geology 1, three hours, Professor Hall and Mr. Grout
German or French 1, five hours, Professor Schlenker and Assistants, or
Professor Benton and Assistants
Rhetoric 1, three hours, Professor Lansing
Botany 1, six hours, Professor Clements and Assistants

Second Semester

Mathematics 2, half semester, three hours, Mr. Roe
Drawing 2, half semester, four hours, Miss Clopath
German or French 1, five hours, Professor Schlenker and Assistants, or
 Professor Benton and Assistants
Rhetoric 1, three hours, Professor Lansing
Botany 1, six hours, Professor Clements and Assistants
Agricultural Chemistry 4, six hours, Mr. Wilhoit

FRESHMAN YEAR

Division B.

For graduates of approved High Schools or others of equal standing

First Semester

Rhetoric 1, three hours, Professor Lansing
Agriculture 11, three hours, Professor A. Boss and Assistants
Agriculture 1, three hours, Professor A. Boss and Assistants
Agricultural Chemistry 1, five hours, Professor Snyder
Horticulture 1, two hours, Professor Green and Assistants
Entomology 1, half semester, three hours, Professor Washburn
Domestic Science 1, four hours, Miss Shepperd
Domestic Art 1, four hours, Mrs. Blair
Drawing 1, four hours, Mr. A. Bull
Domestic Economics 1, three hours, Mrs. Boutell
Physical Training, two hours, Miss Whitridge

Second Semester

Agricultural Chemistry 3, six hours, Miss Craig
Horticulture 3, half semester, three hours, Professor Green and Assistants
Animal Husbandry 4, half semester, three hours, Mr. Drew
Domestic Science 1, four hours, Miss Shepperd
Domestic Art 1, four hours, Mrs. Blair
Drawing 2, half semester, four hours, Miss Clopath
Rhetoric 1, three hours, Professor Lansing
Mathematics 3, half semester, three hours, Mr. Roe
Horticulture 3, half semester, four hours, Mr. Cady
Dairy Husbandry 1, half semester, four hours, Professor Haecker and
 Assistants
Domestic Economics, 3, three hours, Dr. Moorhead
Animal Husbandry 5, half semester, one hour, Professor A. Boss
Physical Training, two hours, Miss Whitridge

SOPHOMORE YEAR

First Semester

Botany 1 (B), six hours, Professor Clements and Assistants

Zoology 1, six hours, Professor Sigerfoos and Assistants

German or French 3, three hours, Professor Schlenker and Assistants, or
Professor Benton and Assistants

Agricultural Chemistry 5, six hours, Professor Snyder and Assistants

Rhetoric 3, three hours, Professor Lansing

Domestic Art 2, four hours, Mrs. Blair

Domestic Science 2, four hours, Miss Shepperd

Second Semester

Botany (B) 1, six hours, Professor Clements and Assistants

Zoology 1, six hours, Professor Sigerfoos and Assistants

German or French 3, three hours, Professor Schlenker and Assistants, or
Professor Benton and Assistants

Agricultural Chemistry 5, six hours, Professor Snyder and Assistants

Rhetoric 3, three hours, Professor Lansing

Domestic Art 2, four hours, Mrs. Blair

Domestic Science 3, one hour, Miss Shepperd

Domestic Science 4, one hour, Dr. Beebe

JUNIOR YEAR

First Semester

Domestic Economics 2, three hours, Mrs. Boutell

Domestic Art 4, four hours, Mrs. Blair

Domestic Science 5, four hours, Miss Shepperd

Education 1, three hours, Assistant Professor Swift

Agricultural Chemistry 6, six hours, Professor Snyder and Assistants

Agricultural Chemistry 7, three hours, Professor Snyder and Assistants

Psychology 1, three hours, Professor Wilde and Assistants

Second Semester

Domestic Science 5, four hours, Miss Shepperd

Domestic Art 4, four hours, Mrs. Blair

Education 2, three hours, Assistant Professor Swift

Agricultural Chemistry 9, six hours, Professor Snyder and Assistants

Farm Structures 6, three hours, Professor Wm. Boss

Drawing 3, four hours, Miss Clopath

Domestic Art 3, three hours, Mrs. Blair

SENIOR YEAR

*First Semester**Domestic Art* 5, three hours, Mrs. Blair*Domestic Science* 6, six hours, Miss Shepperd*Psychology* 2, three hours, Professor Wilde and Assistants*Farm Structures* 7, three hours, Professor Wm. Boss*English, elective*, three hours, Professor Burton and Assistants*Elective*, three hours*Second Semester**Domestic Science* 6, six hours, Miss Shepperd*Domestic Art* 6, six hours, Mrs. Blair*Agricultural Chemistry* 13, three hours, Miss Craig*Horticulture, elective*, three hours, Professor Green and Assistants*Elective*, three hours*Elective*, three hours

NORMAL COURSE

FIRST YEAR

Same as Freshman Year in course of Home Economics

SECOND YEAR

*First Semester**Domestic Economics* 2, three hours, Mrs. Boutelle*Domestic Science* 5, six hours, Miss Shepperd*Domestic Art* 2, four hours, Mrs. Blair*Rhetoric* 2, three hours, Professor Lansing*Agricultural Chemistry* 7, three hours, Professor Snyder*Psychology* 1, three hours, Professor Wilde and Assistants*Botany* 1, six hours, Professor Clements and Assistants*Domestic Art* 3, three hours, Mrs. Blair*Second Semester**Domestic Science* 5, six hours, Miss Shepperd*Domestic Art* 2, four hours, Mrs. Blair*Rhetoric* 2, three hours, Professor Lansing*Agricultural Chemistry* 13, three hours, Miss Craig*Child Psychology*, three hours, Professor Wilde and Assistants*Botany* 1, six hours, Professor Clements and Assistants*Domestic Science* 3, one hour, Miss Shepperd*Domestic Science* 4, one hour, Dr. Beebe*Drawing* 3, four hours, Miss Clopath

Courses of Study

AGRICULTURE

1. **AGRONOMY** ASSISTANT PROFESSOR BULL
Three credits (three hours per week) First semester
Open to freshmen registered in division B.
An elementary course in the study of farm management, crop rotation and the planning and platting of farms; the production and care of manures; the relation of weeds to crop production and profits; the planting, cultivating, harvesting, storing, seed-selection and marketing of grains, roots, fiber, sugar, hay and other forage crops; meadows and pastures; treatment of field crop diseases; plant selection and breeding methods.
2. **FARM DEVELOPMENT** MR. PARKER
Three credits (three hours per week) Second semester
Open to freshmen registered in division B.
It is proposed in teaching this subject to cover the elementary principles governing the science of agriculture. The work covers the origin, formation and cultivation of soils; the movement and control of soil moisture; subduing fields; a study of drainage, roads, fences, water supply; the relation of science to agriculture and farm life; a general consideration of farm practices and farming as a business.
3. **FARM MACHINERY** MR. BASSETT
Two credits, elective (four hours per week) Second semester
Open to freshmen registered in division B.
Practical suggestions and practice work are given in connection with the best methods of adjustment, handling and adaptation of the various kinds of machinery to the soil, weeds and seasons. Durability and convenience in manipulation are chief among the points considered.
4. **FIELD CROPS AND SEEDS** ASSISTANT PROFESSOR BULL
Three credits (three hours per week) First semester
Open to seniors.
Students registering for the course must have had at least one year's work in University botany. The course is outlined to occupy two lecture periods and two laboratory periods per week.
 - (a) **Seeds: their identity and value.**
In this course the students are made acquainted with the physical botany, the uses, identification, vitality, testing, grading and judging of all classes of field seeds. Special attention is given to the reproducing value of seeds of various grades of grains and to the importance of testing. A thesis upon some phase of the subject of seeds is required for full credit.
 - (b) **Field Crops: their structure and use.**
In this course are considered the botany, cultivation, and economic value of the various cereal, forage, root, fiber, sugar and miscellaneous crops. Special attention is given to the subjects of meadows, pastures, soilage crops, and to the production and preservation of all kinds of dry cured and ensilaged crops.
5. **THREMMATOLOGY** ASSISTANT PROFESSOR BULL
Three credits (three hours per week) First semester
Open to juniors. Given in alternate years.
Heredity, variation, law of breeding, the art of breeding, im-

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movement by nature and under scientific experimentation, securing foundation stocks, value of using very large numbers, importance of the occasional individual which can transmit qualities of peculiar value, use of an ideal, use and misuse of the score card, both numerical and graphic, intrinsic qualities, key points and distinguishing marks, statistical methods in breeding pedigree records of efficiency, fundamental principles underlying the arrangement of the record books, bibliography and terminology, study of the literature of breeding.

- PLANT BREEDING** ASSISTANT PROFESSOR BULL
 Three credits, elective (three hours per week) First semester
 Open to juniors. Given in alternate years.
 Study of the reproductive organs of field crops, field crop nursery management, producing new qualities by hybridizing and by change of environment, hybridizing versus cross-breeding, in-breeding and self fertilization, originating varieties and improving standard varieties by selection and by hybridizing, followed by selection, methods of disseminating new varieties, seed and plant introduction, experimentation in the theories relating to heredity, variation and practical breeding, seed growing as a farm business, seed merchandising and the breeding of each of the various field crops grown in Minnesota.
- AGRICULTURAL ENGINEERING** PROFESSOR STUART
 Three credits, elective (six hours per week) Second semester
 Open as an elective to juniors and seniors.
 Subduing prairie and timber soils, land drainage, farm land mensuration and surveying; irrigation and irrigation works; roads, their location, maintenance, laws and construction, financial support; farm fences, buildings, implements and machinery.
- AGRICULTURAL ECONOMICS** MR. PARKER
 One and one-half credits, elective (three hours per week for nine weeks) Second semester
 Open to juniors.
 Labor, farm finances, markets, rentals, agricultural statistics, production, exports, wages, land laws, ownership, taxes, organizations.
- FARM MANAGEMENT** MR. WILSON
 One and one-half credits (three hours per week for nine weeks) Second semester
 Open to juniors.
 In this course are considered the planning of farms, crop rotation, tillage, and systems of farming. Special attention is given to revising and drafting farm plans and to arranging economic crop rotations, and application of business methods to farm operations.
- AGRICULTURAL PRACTICUMS**
 (Four hours per week)
 Opportunities to gain practical experience, to acquire greater manual dexterity in doing farm work, to secure practice in conducting experiments and to get experience in teaching agricultural subjects, are offered to college and graduate students when practicable. Students should arrange early in their course for this work, as the opportunities in plant breeding, in rural engineering, in field crops, in agricultural statistics and in assisting instructors in the various courses are available only at irregular intervals and must be arranged for in advance.
- AGRICULTURAL ENGINEERING** PROFESSOR STEWART
 Opportunities to gain practical experience, to acquire greater
- FIELD AGRICULTURE** PROFESSOR A. BOSS AND ASSISTANTS
 (Three hours per week) First semester
 Open to Freshman girls in Div. B.
 A study of the soil origin and types of soil as affecting crop production in Minnesota; soil conditions as affecting moisture and crop growth; planning of fields and farms in consideration of classes of field crops, and the relation of crops to each other in rotation and the business of farming.

AGRICULTURAL CHEMISTRY AND SOILS

1. AGRICULTURAL CHEMISTRY
(Five hours per week)

PROFESSOR SNYDER
First semester

Open to freshmen registered in division B.

In agricultural chemistry, one term is given to the study of the elements and compounds which are of most importance in agriculture. This work is planned to prepare the student for intelligent study of the subject of the chemistry of foods, soils and fertilizers, and at the same time to familiarize him with the more important chemical changes which take place in every-day life. Laboratory practice forms a prominent feature of the work in agricultural chemistry. In the chemistry of foods, the composition of plant and animal bodies, the chemistry of the plant and of its food and growth, the chemistry of animal nutrition, digestibility and value of foods, and the laws governing the economic uses of foods, are some of the subjects considered. The composition and the utilization of farm crops for food purposes, and the application of the principles of chemistry to plant and animal life, form the basis of this work.

In dairy chemistry, the chemical and allied changes which take place in the handling of milk and its manufacture into butter and cheese and the application of these principles to the production of milk and its products form the basis of this work.

2. SOILS AND FERTILIZERS
(Six hours per week)

PROFESSOR SNYDER
Second semester

Open to freshmen registered in division B.

Some of the topics studied are: The formation of soils, adaptability of crops to different kinds of soils, chemical composition of soils, physical analysis of soils, interpretation of soil analysis, the judging, rating and scaling of soils, alkali soils, acid soils, humus and other relations to soil fertility, the factors governing the increase and decrease of the nitrogen of the soil, farm manures, their composition and uses, and their action upon soils; green manures, commercial fertilizers, special purpose fertilizers and their use; the influence of different methods of cultivation upon the fertility of the soil, the food requirements of farm crops, the rotation of crops as affecting the fertility of the soil, the income and outgo of fertility from farms where different systems of farming are followed, the general principles of soil exhaustion and soil improvement and the various factors which affect the fertility of soils. The class room work is supplemented by laboratory practice.

3. DOMESTIC CHEMISTRY
(Six hours per week)

MISS CRAIG
Second semester

Open to freshmen registered in division B.

The combination of human foods to form balanced rations, dietary studies of families, cost and value of foods, losses in the cooking and preparation of foods, cereal food products, animal food products, adulterations of foods and their detection, fuels, soaps, dye stuffs and colors, composition of common household utensils, the household water supply, preparation of home-made baking powders, bakers' chemicals, the composition, food value and characteristics of tea, coffee, chocolate, cocoa, molasses, honey, vinegar and spices, the grading and testing of wheat flour and the chemistry of bread making, form the essential parts of this work.

4. GENERAL CHEMISTRY

MR. WILHOIT
Second semester

Three credits (three hours per week)

Open to freshmen registered in division A.

Recitations, lectures, and laboratory practice. Particular attention is given to the study of the elements and compounds which are of the most importance in agriculture. The laws governing the combination of the elements by weight and volume are illustrated by numerous problems. The writing of equations, chemical nomenclature, and the periodic system of classifying

provement by nature and under scientific experimentation, securing foundation stocks, value of using very large numbers, immense value of the occasional individual which can transmit qualities of peculiar value, use of an ideal, use and misuse of the score card, both numerical and graphic, intrinsic qualities, fancy points and distinguishing marks, statistical methods in breeding pedigree records of efficiency, fundamental principles underlying the arrangement of the record books, bibliography and terminology, study of the literature of breeding.

6. **PLANT BREEDING** ASSISTANT PROFESSOR BULL
 Three credits, elective (three hours per week) First semester
 Open to juniors. Given in alternate years.
 Botany of the reproductive organs of field crops, field crop nursery management, producing new qualities by hybridizing and by change of environment, hybridizing versus cross-breeding, in-breeding and self fertilization, originating varieties and improving standard varieties by selection and by hybridizing, followed by selection, methods of disseminating new varieties, seed and plant introduction, experimentation in the theories relating to heredity, variation and practical breeding, seed growing as a farm business, seed merchandising and the breeding of each of the various field crops grown in Minnesota.
7. **AGRICULTURAL ENGINEERING** PROFESSOR STUART
 Three credits, elective (six hours per week) Second semester
 Open as an elective to juniors and seniors.
 Subduing prairie and timber soils, land drainage, farm land mensuration and surveying; irrigation and irrigation works; roads, their location, maintenance, laws and construction, financial support; farm fences, buildings, implements and machinery.
8. **AGRICULTURAL ECONOMICS** MR. PARKER
 One and one-half credits, elective (three hours per week for nine weeks) Second semester
 Open to juniors.
 Labor, farm finances, markets, rentals, agricultural statistics, production, exports, wages, land laws, ownership, taxes, organizations.
9. **FARM MANAGEMENT** MR. WILSON
 One and one-half credits (three hours per week for nine weeks) Second semester
 Open to juniors.
 In this course are considered the planning of farms, crop rotation, tillage, and systems of farming. Special attention is given to revising and drafting farm plans and to arranging economic crop rotations, and application of business methods to farm operations.
10. **AGRICULTURAL PRACTICUMS**
 (Four hours per week)
 Opportunities to gain practical experience, to acquire greater manual dexterity in doing farm work, to secure practice in conducting experiments and to get experience in teaching agricultural subjects, are offered to college and graduate students when practicable. Students should arrange early in their course for this work, as the opportunities in plant breeding, in rural engineering, in field crops, in agricultural statistics and in assisting instructors in the various courses are available only at irregular intervals and must be arranged for in advance.
7. **AGRICULTURAL ENGINEERING** PROFESSOR STEWART
 Opportunities to gain practical experience, to acquire greater
11. **FIELD AGRICULTURE** PROFESSOR A. BOSS AND ASSISTANTS
 (Three hours per week) First semester
 Open to Freshman girls in Div. B.
 A study of the soil origin and types of soil as affecting crop production in Minnesota; soil conditions as affecting moisture and crop growth; planning of fields and farms in consideration of classes of field crops, and the relation of crops to each other in rotation and the business of farming.

AGRICULTURAL CHEMISTRY AND SOILS

1. AGRICULTURAL CHEMISTRY

PROFESSOR SNYDER

(Five hours per week)

First semester

Open to freshmen registered in division B.

In agricultural chemistry, one term is given to the study of the elements and compounds which are of most importance in agriculture. This work is planned to prepare the student for intelligent study of the subject of the chemistry of foods, soils and fertilizers, and at the same time to familiarize him with the more important chemical changes which take place in every-day life. Laboratory practice forms a prominent feature of the work in agricultural chemistry. In the chemistry of foods, the composition of plant and animal bodies, the chemistry of the plant and of its food and growth, the chemistry of animal nutrition, digestibility and value of foods, and the laws governing the economic uses of foods, are some of the subjects considered. The composition and the utilization of farm crops for food purposes, and the application of the principles of chemistry to plant and animal life, form the basis of this work.

In dairy chemistry, the chemical and allied changes which take place in the handling of milk and its manufacture into butter and cheese and the application of these principles to the production of milk and its products form the basis of this work.

2. SOILS AND FERTILIZERS

PROFESSOR SNYDER

(Six hours per week)

Second semester

Open to freshmen registered in division B.

Some of the topics studied are: The formation of soils, adaptability of crops to different kinds of soils, chemical composition of soils, physical analysis of soils, interpretation of soil analysis, the judging, rating and scaling of soils, alkali soils, acid soils, humus and other relations to soil fertility, the factors governing the increase and decrease of the nitrogen of the soil, farm manures, their composition and uses, and their action upon soils; green manures, commercial fertilizers, special purpose fertilizers and their use; the influence of different methods of cultivation upon the fertility of the soil, the food requirements of farm crops, the rotation of crops as affecting the fertility of the soil, the income and outgo of fertility from farms where different systems of farming are followed, the general principles of soil exhaustion and soil improvement and the various factors which affect the fertility of soils. The class room work is supplemented by laboratory practice.

3. DOMESTIC CHEMISTRY

MISS CRAIG

(Six hours per week)

Second semester

Open to freshmen registered in division B.

The combination of human foods to form balanced rations, dietary studies of families, cost and value of foods, losses in the cooking and preparation of foods, cereal food products, animal food products, adulterations of foods and their detection, fuels, soaps, dye stuffs and colors, composition of common household utensils, the household water supply, preparation of home-made baking powders, bakers' chemicals, the composition, food value and characteristics of tea, coffee, chocolate, cocoa, molasses, honey, vinegar and spices, the grading and testing of wheat flour and the chemistry of bread making, form the essential parts of this work.

4. GENERAL CHEMISTRY

MR. WILHOIT

Three credits (three hours per week)

Second semester

Open to freshmen registered in division A.

Recitations, lectures, and laboratory practice. Particular attention is given to the study of the elements and compounds which are of the most importance in agriculture. The laws governing the combination of the elements by weight and volume are illustrated by numerous problems. The writing of equations, chemical nomenclature, and the periodic system of classifying

the elements are prominent features of the work. In the laboratory experiments are performed illustrating the general laws of chemistry which have a bearing upon animal and plant life.

5. AGRICULTURAL QUALITATIVE ANALYSIS

MR. WILHOIT

Six credits (six hours per week)

First and second semesters

Open to sophomores.

This course is arranged to meet the wants of agricultural students.

Six hours per week are given to the laboratory work and one period to a lecture and recitation. The writing of equations and the study of principles involved in the separation of the various groups and individual compounds of elements are characteristic features of this work. It is the object of this course to familiarize the student with the processes employed in qualitative analysis, so that he may be able to determine the composition of all ordinary substances, particularly of those that are of the most importance in agriculture.

6. AGRICULTURAL QUANTITATIVE ANALYSIS

PROFESSOR SNYDER

Three credits (six hours per week)

First semester

Open to juniors and seniors.

An elementary course in quantitative analysis. The principles involved in gravimetric and volumetric analysis are studied. Two periods per week are given to laboratory work and one period to a recitation and lecture. The work includes the gravimetric and volumetric determinations of iron, acidimetry and alkali-metry, the gravimetric determination of phosphorus pentoxide, the volumetric determination of calcium oxide, and the determination of nitrogen and potassium oxide. The object of this course is to prepare the student for special work in agricultural chemistry, and is required of all students who elect either course 10 or 11.

7. HUMAN AND ANIMAL FOODS

PROFESSOR SNYDER

Three credits (three hours per week)

First semester

Open to juniors. Given in alternate years.

Lectures. This course treats of the composition, digestibility and nutritive value of human and animal foods. The chemistry of plant growth particularly the factors which influence their composition and nutritive value, forms an essential part of this course. The processes employed in the preparation of foods, as the milling of wheat and other cereals, the economic uses of human and animal foods, the comparative value of foods, and the chemical methods employed in human nutrition investigations, particularly in proteid and carbohydrate metabolism, and the losses of energy from the body, are studied. Dietary studies, including the cost of nutrients, and influence of different methods of preparation upon their nutritive value, are also included in the work. It is the object of this course to familiarize the student with the fundamental principles of nutrition and the use of the literature upon the subject. Special attention is given to the economic production of foods and their utilization for human and animal food purposes.

8. SOILS AND FERTILIZERS

PROFESSOR SNYDER

Three credits (three hours per week)

Second semester

Open to juniors. Given in alternate years.

Lectures. This course treats of the relation of soils and their fertility to the production of crops, and includes a study of the sources of plant food and the influence of tillage and manures upon the chemical and allied physical and biological changes which take place in the soil in rendering plant food available. Rock disintegration and soil production, the various types of soil formed from different kinds of rocks and their agricultural value, and the inherent fertility of soils, form an essential part of the work. The control of the water in the soil, soil solutions and leachings, the presence of injurious acid compounds and alkaline salts, the various methods employed for the improvement of soils, soil organisms and their

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influence upon fertility, the organic compounds of the soil and the part which they take in soil fertility the increase and decrease of the organic matter and the nitrogen of the soil as influenced by different methods of farming, manures, and the causes of soil exhaustion and means employed, the analyses of soils, and the application and interpretation of the results, uses of commercial fertilizers and green and farm fertilizers for conservation of fertility, adaptability of crops to soils and rotation of crops as affecting the fertility of the soil are some of the topics discussed. Soil judging, rating and scaling form a part of the work.

9. THE ANALYSIS OF FOODS (elective)

PROFESSOR SN

Three credits (six hours per week)

First or second sem

Open to juniors and seniors.

This work includes the determination of water, ash, starch, sugar, cellulose, pentosans, fats, proteids, and the different forms of nitrogen in food stuffs, the use of the calorimeter, and the polariscope in food analysis. Before completing the work, each student makes a complete proximate analysis of some food material. This course is planned to meet the wants of those who desire to become familiar with the methods employed in the analysis of foods and in nutrition investigations.

This course includes, also, the analysis of dairy and animal products, as fodders, milk, butter, cheese, and animal feces. Special features of the course are the determinations of volatile fatty acids, iodine absorption, specific gravity, and the saponification equivalent of fats. The object of this course is to meet the wants of those who desire to become familiar with the methods of investigations employed in research in dairy chemistry.

10. THE ANALYSIS OF SOILS AND FERTILIZERS (elective)

PROFESSOR SNYDER AND MR. WIL

Three credits (six hours per week)

Open to juniors and seniors.

(a) The chemical analysis of soils.

Laboratory practice in the chemical analysis of soils and the study of the chemical methods employed in soil investigations. Particular attention is given to the study of the organic compounds of soil, and an opportunity is offered for the study of experimental soil work applied to field investigations.

(b) The physical analysis of soils.

Laboratory practice in the physical analysis of soils by means of Hilgard's elecutrator, and the sedimentation methods as modified by the use of centrifugal apparatus.

Course 10 is intended for students who desire to make a specialty of the subject of soils.

11. SPECIAL PROBLEMS (elective)

**PROFESSOR SNYDER, ASSISTANT
PROFESSOR HUMMEL AND MR. WIL**

Seminar and laboratory work in the study of special problems in agricultural chemistry, as the analysis of water for irrigation purposes, the adulteration of foods, dietetics, and problems in agricultural technology.

12. CHEMISTRY OF FOREST PRODUCTS

ASSISTANT PROFESSOR HUN

Three credits (three hours per week)

First sem

Open to seniors.

In this course a special study is made of the products of the forest other than for timber and fuel. The products studied include cellulose for the manufacture of paper, sugar, tanning materials, turpentine, tar, oils, resin, waxes, gums, creosote, wood alcohol, acetic acid, acetone, essential oils, charcoal, camphor, and medicinal products. The subjects of paint and methods for the preservation of wood are also taken up. At

the beginning of the course a short time is devoted to a review of organic chemistry, special attention being given to those compounds found in wood or closely related to it. A thesis on some subject relating to the chemistry of forest products is required in this course.

13. DOMESTIC CHEMISTRY AND DIETETICS

Three credits (six hours per week)

Open to seniors.

Lectures and laboratory practice. Advanced course. Courses 7 and 9 required as preliminary preparation.

MISS CRAIG
Second semester

ANIMAL HUSBANDRY

1. STUDY OF BREEDS

(Three hours per week)

Open to freshmen registered in division B.

The market classes of horses, cattle, sheep, and swine are taken up briefly to bring out the form, quality, and condition desirable and common to the different classes. This is followed in each class of stock with the most common and valuable breeds for the state. These are studied carefully as regards their characteristics and origination, and as to their adaptability to the different Minnesota conditions. This work is illustrated with stock from herds and flocks maintained at the University farm for this purpose.

MR. SCHROEDER
First semester

2. STOCK JUDGING

(Four hours per week)

Open to freshmen registered in division B.

Score cards are used to an extent sufficient to familiarize students with that method of judging, and special efforts are made to do systematic and closely critical work in the selection of animals representative of the market classes of stock. Living specimens are used and rings made up for the student contests in stock judging. In connection with the work in dressing and curing meats, the judgment passed on live animals for the block is verified by score cards, judgment of the dressed carcasses, and by actual block tests. These tests are made by the students and bring out the percentage of meat in each commercial cut of the carcass. The quality of meat is passed upon in this connection by experts, and a careful report made to ascertain the type of animals best calculated for the production of the most meat of the best quality.

MR. SCHROEDER
Second semester

3. FEEDING AND BREEDING

(Three hours per week)

Open to freshmen registered in division B.

Feeding, first nine weeks.

The principles of feeding as applied to the production of horses, cattle, sheep and swine, are taught. Special attention is given to the choice and preparation of food for animals during different periods of growth and during the time they are used for breeding purposes and to summer feeding and pasturage. Practice is given in compounding rations that will include in the best manner the food stuffs commonly produced on the farm.

PROFESSOR BOSS AND ASSISTANT
PROFESSOR GAUMNITZ
Second semester

ANIMAL BREEDING, last nine weeks

Open to freshmen registered in division B.

Students receive instruction in the principles that govern breeding; in the influences that affect heredity and in the care and management of breeding stock. Pedigree receives careful consideration and each student is required to make out pedigrees of two or more pure-bred animals. They are also required to become familiar with methods of keeping live stock records of all kinds.

4. POULTRY

MR. DREW
Second semester

(Three hours per week)

Open to freshmen registered in division B.

The instruction in this subject will include the following topics:

History and characteristics of the leading breeds of poultry; breeding, rearing and management of fowls for eggs and for the market; planning, building and arrangement of poultry houses; managing incubators and brooders. A model poultry house, containing pens of the most improved breeds, incubator cellar, work-room, etc., has been provided, where experimental work and practical instruction are carried on.

5. MEATS

ASSISTANT PROFESSOR GAUMNITZ
Second semester

(One hour per week)

Open to freshmen girls registered in division B.

The instruction given to the students in home economics in the subject of meats pertains to the selection and value of different classes of meat and to the best methods of curing and preserving.

6. STOCK JUDGING (elective)

ASSISTANT PROFESSOR GAUMNITZ
First semester

Three credits (six hours per week)

Open to sophomores.

This course is calculated to meet the needs of students desiring to become expert stock judges and of those who wish to study animal form with a view of becoming breeders of superior animals.

Score card work in combination with the presence of living specimens is a feature of this course. Students are drilled in judging from the standpoint of breed, type, form, stamina, quality, breeding, capacity, suitability for feeding and for general and specific production.

7. STOCK JUDGING

PROFESSOR BOSS AND ASSISTANT PROFESSOR GAUMNITZ
First semester

Three credits (six hours per week)

Open to seniors.

An advanced course consisting of practice in judging market classes of fat stock and special work with breeding stock.

Trips of inspection to neighboring stock farms will be made and work given in county fair judging where suitable arrangements can be made.

8. STOCK BREEDING

PROFESSOR BOSS
Second semester

Three credits (three hours per week)

Open to juniors.

Discussion of the principles of stock breeding as affecting breed maintenance and breed formation; standards of excellence and comparison of standards of breeds; heredity and the influences affecting it; prepotency, fecundity and their relation to successful breeding; the influence of nutrition on animal growth and form, and the effect of artificial conditions, early maturity, selection and pedigree, and a study of the early history of breeds of live stock and of methods of breeders famous in live stock improvement.

9. LIVE STOCK FEEDING AND MANAGEMENT

PROFESSOR BOSS
Second semester

Three credits (three hours per week)

Open to sophomores.

The principles of feeding as applied to economical production; feeding rations, feed stuffs, methods of feeding, care and management of breeding and fattening stock, management of animals during pasture, yard and stall feeding for the block, selection of animals for the feed lot, and stabling and stable management suitable for the various classes of live stock. The work is based on the investigations of the experiment stations and a careful review of station bulletins and publications will be made.

10. **STOCK FARM MANAGEMENT** **MR. WILSON**
 Three credits (three hours per week) **Second semester**
 Open to juniors.
 In this course special attention is given to the crops and rotations that fit in with live stock farming, economy of feeds and pasture production, and solution of confronting problems is made the leading feature.

11. **ANIMAL NUTRITION STUDIES** **PROFESSOR BOSS**
 Three credits (three hours per week) **First semester**
 Open to seniors.
 Original work in special live stock problems related to meat production followed by a thesis; sufficient original work must be done to form a reliable basis for conclusions.

12. **MEATS** **ASSISTANT PROFESSOR GAUMNITZ**
 Three credits (three hours per week) **First semester**
 Open to juniors.
 A continuation of studies in meats as outlined in the school course. Supplemented by dissection and studies of muscular structure of various kinds of meat.
 This course is designed especially for studying meat making animals and their products. Under general guidance each student makes up rings of animals which he studies in detail, at every step from the live state until the different parts are cooked and tested at the table. Full records and conclusions, as well as illustrations, are required in thesis form.

13. **LIVE STOCK RECORDS AND RESEARCH** **PROFESSOR BOSS**
 Three credits (six hours per week) **Second semester**
 Open to seniors.
 This course will consist of reviewing literature upon different phases of live stock production. The Experiment Station records and other sources of information will be used largely. This together with original work will form the basis of extended compilation of material on live stock husbandry, and a thorough study of systems of keeping and compiling stock records upon stock farms and at experiment stations. Sufficient actual practice will be required to become familiar with live stock records and herd books.

14. **ANIMAL BY-PRODUCTS** **PROFESSOR BOSS AND MR. PATERSON**
 Three credits (three hours per week) **Second semester**
 Open to seniors.
 Individual study of the by-products manufactured at the large packing houses will be required of each student. The value and place that each has in economic use is considered.

15. **ADVANCED MEATS AND JUDGING** **PROFESSOR BOSS AND ASSISTANT**
PROFESSOR GAUMNITZ
 Three credits, elective (six hours per week) **Second semester**
 Open to juniors and seniors.
 Work along this line is a continuation of that begun in course 12. More attention is given the more important details concerning meat and a minute study of its physical and chemical composition is required.

16. **ANIMAL MECHANICS** **PROFESSOR REYNOLDS AND ASSISTANT**
PROFESSOR GAUMNITZ
 Three credits (three hours per week) **Second semester**
 Open to seniors.
 A study of the mechanical effects of different relationships of bone and muscle in the animal body. This applies particularly to horses. The entire feet and legs as well as the body will be studied and made clear by apparatus and original illustrations.

17. **LIVE STOCK PRACTICUMS** **MR. SCHROEDER**
 Feeding and stable management of cattle, horses, sheep and swine, recording and calculating amounts of pasturage ob-

tained from different forage crops, keeping herd records, writing pedigrees and recording animals, calculating feeding records and cost of production, mechanical analysis of carcasses of animals to determine total amount of meat, and proportionate amounts of fat and lean, determinations of fat and lean meat with specially designed apparatus; calculating percentage of different parts of the carcass.

BOTANY

1. **GENERAL BOTANY** PROFESSOR CLEMENTS, ASSISTANT PROFESSORS
TILDEN AND ROSENDAHL, MESSRS. HUFF AND BUTTERS
Six credits (six hours per week) First and second semesters
Open to freshmen.
Greenhouse study of the behavior and structure of flowering plants, following the life cycle from germination to seed production; laboratory study of the evolution of the plant kingdom, and the underlying principles of plant life; laboratory and greenhouse work in the identification and relationship of flowering plants, together with field work on the plants of forest and grassland; practical papers on selected topics, viz., bacteria, plant growth, evolution, etc.
2. **ADVANCED BOTANY** PROFESSOR CLEMENTS, ASSISTANT PROFESSORS
TILDEN AND ROSENDAHL
Six credits (six hours per week) First and second semesters
Open to sophomores.
Systematic work in the naming and classification of plants, chiefly of the groups of economic importance, i. e., flowering plants, fungi and algae, with emphasis on the common plants of Minnesota; ecological study in the greenhouse of the structure and meaning of the adaptations of root, stem and leaf, and in the field of the principles of plant distribution, migration and grouping; cytological study of growth, production of pollen and egg-cells, fertilization, hybridization and seed formation; one practical paper each semester, cytology of plant breeding and the botany of a group of economic plants for horticultural students, plant adaptations and the life history of a forest for forestry students.
3. **PHYSIOLOGY AND ECOLOGY** PROFESSOR CLEMENTS AND MR. HUFF
Six credits (six hours per week) First and second semesters
Open to juniors.
Study of the factors which make the plant's home, viz., water, light, soil, heat, etc.; response of the plant to its home, absorption, transport, water-loss, food-making, storage, growth, fertilization and reproduction; adaptation of plants to their various homes, and the origin of new forms by selection, adaptation, mutation and hybridization; structure and development of vegetation, i. e., grouping, migration, competition, acclimatization, invasion, succession, zonation, etc. of plants; one practical paper each semester on selected topics, e. g., accclimatization, adaptation, origin of new forms, vegetation of Minnesota, of North America, etc.
7. **FLOWERING PLANTS** ASSISTANT PROFESSOR ROSENDAHL
Six credits (six hours per week) Both semesters
Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.
The course is designed to afford the student an opportunity to become proficient in the determination of plant species and plant types, as well as to show the genetic development and relationships of the flowering plants. Lectures, reference reading, laboratory, greenhouse and herbarium work, together with field work in the fall and spring.

8. **ECOLOGY** **PROFESSOR CLEMENTS**
 Six credits (six hours per week) **Both semesters**
 Open to those who have completed courses 1, 2 and 3; the laboratory fee is three dollars per semester.

A critical study of plant habitats by means of instruments, and the adaptations produced by water and by light, together with a careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work.

9. **PLANT PHYSIOLOGY** **PROFESSOR CLEMENTS**
 Six credits (six hours per week) **Both semesters**
 Open to those who have completed courses 1, 2 and 3; the laboratory fee is three dollars per semester; alternates with course 8.

A study of the relations of factor, function and structure in the various organs of the plant, with special reference to absorption, transpiration, photosynthesis, respiration, irritability, and reproduction. Class discussions and quizzes, greenhouse and field work.

11. **INDUSTRIAL BOTANY** **ASSISTANT PROFESSOR TILDEN**
 Six credits (six hours per week) **Both semesters**
 Open to technical students who have completed course 1 and to academic students who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

A study of the origin, distribution and cultivation of plants, yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.

VEGETABLE PATHOLOGY AND BOTANY

1. **PLANT PATHOLOGY** **PROFESSOR FREEMAN**
 Six credits (six hours per week) **First and second semesters**
 Open to juniors.

General outline of the diseases of plants due to fungus organisms; a special study of the life histories and classification of the most important plant diseases, particularly those affecting economic plants of Minnesota. Thesis work and specialization according to the interests of the students; for instance, for forestry students, diseases of forest trees; for agronomy students, diseases of cereal crops, etc. Special attention is paid to methods of prevention and cure. Lectures, reference reading, laboratory and thesis work.

2. **WOOD TECHNOLOGY** **PROFESSOR FREEMAN**
 Three credits (six hours per week) **Second semester**
 Open to sophomores in forestry course.

A comprehensive study of the structural features of types of the most important woods of commerce; special reference to the woods of the United States, and particularly those of this state. Structural development in the life of the tree. Physical and mechanical characters as related to the structural features. A comparative study of a large number of woods with a view to identification and classification. Thesis work on the detail studies in the histology of woods.

DAIRY HUSBANDRY AND ANIMAL NUTRITION

1. **DAIRY STOCK AND DAIRY FARM MANAGEMENT** **PROFESSOR HAECKER**
 Three credits, elective (three hours per week)
 The lectures cover a brief history of the dairy breeds. The fundamental principles of breeding for milk production, the rearing of

dairy stock with the object of developing the highest efficiency in the mature animal and the study of the gross anatomy of the dairy cow in its relation to milk production, form essential features of the course. One hour per week is given in tracing pedigrees and in practice work in the management, care and judging of dairy stock.

2. **BUTTER MAKING** PROFESSOR HAECKER AND ASSISTANTS
(Four hours per week)
The running of separators; ripening and churning of cream; how to ripen cream to secure best flavor; how to churn, wash and salt butter so as to avoid specks and mottles; to secure good grain and best methods of preparing for market—are some of the points which receive special attention. As all creamery men should be able to judge butter from a commercial standpoint, students are trained daily in the art of scoring butter by the score card.
3. **PRINCIPLES OF ANIMAL NUTRITION** PROFESSOR HAECKER
Three credits (three hours per week) First semester
Open to juniors.
Lectures and class room work. The principles of nutrition and their relation to the economic production of animals and animal products form the basis of this course. Practice work is given in formulating and compounding rations, in the study of the comparative value of food stuffs and other problems relating to feeding.
4. **FACTORY DAIRYING** PROFESSOR HAECKER
Elective Second semester
Open to juniors.
This is offered during the session of the dairy school, beginning November 18th. Lectures in the forenoon on dairy bacteriology, dairy chemistry, the care of milk and cream, lactic cultures, flavors, cleaning milk, cream ripening and churning, working and packing butter. In the afternoon, students are given two and a half periods' practice in the factory training rooms and in the dairy laboratory.
5. **NUTRITION RESEARCH** PROFESSOR HAECKER
Three credits (elective) First semester
Open to seniors.
Seminar and laboratory work in the study of animal nutrition problems. This course is open to advanced students and is offered during the last half of the first and the first half of the second semester. The student is required to become familiar with the literature of some phase of animal nutrition, outline and conduct and investigation under the supervision of the instructors of the department, and prepare a suitable report of the investigation. The object of this course is to familiarize the student with the methods employed in the study of animal nutrition problems.

DOMESTIC ART

1. **ELEMENTARY SEWING** MRS. BLAIR
(Four hours per week) First and second semesters
Open to freshmen registered in division B.
Instruction is given in hand-sewing, including the different stitches, hems, seams, gussets, plackets, fastenings and the various kinds of darning and patching, taking up the practical application of each. Talks are given on the use and care of the work basket, touching upon the history of its implements, and upon the textiles, cotton, wool, silk and linen.
2. **DESIGNS IN DRAFTING** MRS. BLAIR
Four credits (four hours per week) First and second semesters
Open to sophomores.
Each student is given instruction in designing, drafting, cutting and making of children's garments, also underwear for adults. The drafting is taught by a simple method in which only a tape

line and square are used. Lecture work deals with the selection of suitable material and the care of the underwear.

3. **TEXTILES** **MRS. BLAIR**
 Three credits (three hours per week) **Second semester**
 Open to juniors.
 A course in textiles is also given the first semester. This includes the study of cotton, linen, flax and wool, the manufacture of the different materials. The student is required to make a note-book containing sample of each material as it is studied.
4. **ADVANCED DESIGNING, DRAFTING, ETC.** **MRS. BLAIR**
 Six credits (six hours per week) **First and second semesters**
 Open to juniors.
 Instruction is given in designing, drafting, fitting and finishing a gown; also a color study from nature in reference to harmony of color in dress. Lectures are given upon proper dress, its style, neatness and suitability to the wearer.
 Practice Teaching.
5. **HOUSEHOLD ART** **MRS. BLAIR**
 Three credits (three hours per week) **First semester**
 Open to juniors.
 Household art lectures are given upon house and grounds, noting the distinctive character of the country home; the sanitary conditions involved in the selection of the site of the house; also the influence of the outlook, an elementary study of architecture in connection with planning a house; instruction in the fundamental value of color, form and design; training the taste and emphasizing the laws of hygiene that should influence the selection of materials and styles in the finishings and furnishings of the house.
6. **HANDICRAFT** **MRS. BLAIR**
 Three credits (six hours per week) **Second semester**
 Open to seniors.
 Pottery, basketry, leather work, weaving, crocheting and knitting are taken up in this course and studied in their simpler forms.

DOMESTIC ECONOMICS

1. **HOME ECONOMICS** **MRS. BOUTELLE**
 (Three hours per week) **First semester**
 Open to freshmen registered in division B.
 This course deals with the problems of economics arising in the home; generic lines of expenditure; values; business methods; standards of living; constructive agencies for economic betterment in the home; lectures, problems and recitations.
2. **EVOLUTION AND ADMINISTRATION OF THE HOME** **MRS. BOUTELLE**
 Three credits (three hours per week) **First semester**
 Open to juniors.
 The home as a social and economic institution and its evolution from primitive conditions; evolution of industrial, social, religious and economic influences in the home; the relation of the home to civic life. The organization and maintenance of a home; the home as a place and an opportunity for the right development of the physical and spiritual natures; lectures, problems and recitations.
3. **DOMESTIC HYGIENE** **DR. MOORHEAD**
 (First nine weeks) **Second semester**
 Open to freshmen registered in division B.
 Several lectures will be given upon maidenhood, maternity and infancy. These special lectures will be supplemented by the regular lectures which consider the health of the family as dependent upon pure food, pure water, personal cleanliness and proper habits as well as upon heredity. The aim is to impress the truth that a knowledge of and obedience to the laws of hygiene are essential to the preservation as well as the restoration of health.

DOMESTIC SCIENCE

1. **ELEMENTARY DOMESTIC SCIENCE** MISS SHEPPERD
 (Four hours per week) First and second semesters
 Open to freshmen registered in division B.
 Fuels. Composition, source and available power for household use are considered together with various appliances used in the culinary art.
 Cooking. The composition, digestibility, food and money value of vegetables, cereals, breads, are carefully studied, and possible losses in preparing and cooking are elaborated by the use of suitable laboratory exercises. The cooking of vegetables, cereals, breads, fruits, jellies, pickles, preserves, etc., are special topics considered.
 Research work is directed largely toward acquiring reliable data regarding the composition, digestibility, comparative food and money values of such materials as are used in the bi-weekly laboratory practice.
 Laundering. During the first half of the second semester the principles of laundering are taken up; removing stains, dyeing, bleaching, etc., as well as the right use of chemicals and machinery in the laundry receive due attention. The comparative value of starches and bluing is studied. The use of hand and commercial laundry machinery is taught by means of demonstration, observation and reading, text-books, lectures, assigned readings and recitations.
2. **DOMESTIC SCIENCE** MISS SHEPPERD
 Two credits (four hours per week) First semester
 Open to sophomores.
 The library reading and class room discussions are limited to reliable data, and the practical work aims to illustrate ways in which foods may be best prepared and served.
3. **DOMESTIC SCIENCE** MISS SHEPPERD
 One credit (one hour per week) Second semester
 Open to sophomores.
 Instruction consists of discussions in regard to the conditions necessary to healthfulness; the general application of sanitary principles in relation to food, air and water; care of plumbing; heating, lighting and ventilating apparatus; disposal of kitchen waste, etc.
4. **BACTERIOLOGY** DR. BEEBE
 One credit (one hour per week, nine weeks) Second semester
 Open to sophomores.
 Lectures once a week during the second semester of the sophomore year. Domestic bacteriology; bacteriology of the common infectious diseases.
5. **DOMESTIC SCIENCE** MISS SHEPPERD
 Four credits (four hours per week) First and second semesters
 Open to juniors.
 Students practice teaching under supervision and independent practice in preparing and serving meals. The object of the former is to train students to teach successfully under varied conditions, thus enabling them to acquire ability to lead pupils to work rapidly, quietly, harmoniously and successfully. The object of the practice work is to ensure an understanding of approved methods and attain efficiency in performing and supervising such work. Special attention is given to methods of teaching. Students are required to elaborate syllabi of lessons on certain topics such as water, air, etc. General information concerning their class work in practice teaching is required in the form of an itemized account, i. e., kind and amount of materials used, number of students present, cost of lessons, etc. The practice teaching must cover at least twenty recitations. Library reading, observation, text book, lectures and discussions.

6. DOMESTIC SCIENCE**MISS SHEPPERD**

Six credits (four hours per week)

First and second semesters

Open to seniors.

The dining room in its different phases of equipment, care, etc.; labor saving devices and the possible application of business methods in housekeeping receive due consideration. Independent teaching with as much practice as possible in selecting food materials at the market, preparing and serving with limited means.

This is the culmination of the student's school work and each is expected to show her ability to use knowledge by preparing floor plans showing equipment, with details for construction and tentative cost of a laboratory kitchen as well as to make lesson outlines, practice their use and revise and perfect them as far as possible.

DRAWING**1. MECHANICAL DRAWING****MR. A. M. BULL**

(Four hours per week)

First semester

Open to freshmen registered in Division B.

The student is taught the practical value of drawing for the purpose of designing and arranging buildings, machinery, etc. He makes drawings of the shop exercises, then works from his own drawings, thereby learning the application.

Designs are made for dwellings, barns, outbuildings, and machinery. As practical subjects for their designs, students are requested to bring from home data for plans of buildings needed on their farms. Estimates are made of the amount of material required and cost of construction.

2. FREE-HAND DRAWING**MISS CLOPETH**

(Four hours per week) one-half semester

Second semester

Open to freshmen.

The study of nature forms, including drawings from plants, landscape, animals and from figures posed. The study of perspective and drawing from objects. Exercises in composition.

3. DESIGNING**MISS CLOPETH**

Two credits (four hours per week)

Second semester

Open to juniors.

Exercises in the various forms of decorative work. Adaptation of plant forms, stencils, lettering. Original designs in different styles for articles of household use. Lectures on composition and principles of design.

4. TOPOGRAPHICAL DRAWING**MR. A. M. BULL**

Three credits (six hours per week)

First semester

Open to sophomores.

Topographic drawing and mapping; exercises in lining and lettering, tracing and blue printing.

5. TOPOGRAPHICAL DRAWING**MR. A. M. BULL**

Three credits (six hours per week)

Second semester

Open to sophomores.

Topographical drawing and mapping, platting, landscape design-
ing.

ECONOMICS**1. ELEMENTS OF ECONOMICS****PROFESSOR ROBINSON, DR. PHELAN****AND MR. COULTER**

Three credits (three hours per week)

Repeated each semester

Open to sophomores, juniors, and seniors; designed for those who desire a general knowledge of economics and as an introduction to the more advanced courses offered in the department. Required of all taking the six year medical course.

A thorough course in the elements of economic theory, with special reference to present day economic and social problems. McVey's *Outline* and a text-book, supplemented by lectures and problems, with a weekly quiz.

2. ECONOMIC GEOGRAPHY

PROFESSOR ROBINSON

First semester

Three credits (three hours per week)

Open to sophomores, juniors, and seniors.

A study of the economic basis of modern civilization. The course embraces (1) a brief survey of the history of commerce prior to the modern period; (2) an analysis of the causes, both in nature and man, which control the development and the localization of industry and commerce; (3) a summary view of the development of transportation in relation to commerce; (4) some mention of the principal materials of commerce; and, (5) a more detailed consideration of the natural resources, chief industries, commercial products, and commercial relations of the leading countries. Special attention is given to the United States and to international trade routes, both by land and sea. Text-book, supplemented by lectures, reports on special topics, and quiz.

3. MODERN INDUSTRIAL AND COMMERCIAL HISTORY

PROFESSOR GRAY

Both semesters

Three credits (three hours per week)

Open to sophomores, juniors, and seniors; may be taken in conjunction with course 1 or course 2; both semesters must be completed before credit is given for the first semester.

The industrial and commercial history of western Europe and America since the middle of the eighteenth century. The effects of modern inventions and political changes on industry and trade. Lectures with prescribed topical readings. One written report of considerable length will be required each semester.

4. ADVANCED ECONOMICS

PROFESSOR ROBINSON

Second semester

Three credits (three hours per week)

Open to those who have completed course 1; required for a major in economics.

An advanced course in general economics, devoted largely to a study of recent theories of distribution.

Assigned readings, reports, and discussions.

5. MONEY AND BANKING

DR. PHELAN

Repeated each semester

Three credits (three hours per week)

Open to those who have completed course 1.

The history and theory of money; nature and uses of credit; functions of banks, trust companies, and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings, and discussions.

28. FINANCIAL HISTORY OF THE UNITED STATES

DR. PHELAN

Second semester

Three credits (three hours per week)

Open to those who have completed courses 1 and 5.

The main lines of our financial development, including our monetary and banking history, are traced by means of lectures. Readings in the literature of the subject and topics for investigation are assigned. Lectures, text-book, assigned readings, and discussions.

6. PUBLIC FINANCE

PROFESSOR ROBINSON

First semester

Three credits (three hours per week)

Open to those who have completed course 1.

The development of the state as an economic organism. Public expenditures from the view point of public wants. Budget systems of the leading countries with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidence, and administration of taxation. The theory of public debts. Text-books, supplemented by lectures and assigned readings.

7. PROBLEMS IN TAXATION

PROFESSOR ROBINSON

Second semester

Three credits (three hours per week)

Open to those who have completed course 6.

Study of tax systems, tax reforms, and special forms of taxation, such as the mortgage, corporation, and inheritance taxes.

Based on Seligman, *Essays in Taxation*, and reports of state tax commissions with lectures and reports on special topics.

8. ECONOMICS OF TRANSPORTATION AND COMMUNICATION

PROFESSOR ROBINSON

Three credits (three hours per week)

Second semester

Open to those who have completed course 1 and to students in the technical colleges.

A general course on the history and theory of transportation and communication with special reference to the United States; early routes and methods of migration and commerce; causes determining the location of railways; effect of steam and electricity in the consolidation of industries and of nations; signal systems, the post, telegraph and telephone; parcels post and express service; economic functions and relations of highways.

14. ECONOMICS OF AGRICULTURE

MR. COULTER

Three credits (three hours per week)

Second semester

Open to those who have completed course 1 or course 2, and to others by special permission of the instructor.

Preliminary survey and classification of industries as extractive, manufacturing, and distributive; and comparison of the several extractive industries in the United States, viz., fishing, forestry, grazing, farming, and mining. Historic development of agriculture and comparison of existing systems, with reference to stage of economic development and geographic conditions. Transition in the United States from extensive to intensive and from general to specialized farming in relation to the law of decreasing returns. Markets, transportation facilities, and other causes affecting the value of land and the prices of farm products. The size, organization, labor-system, and ownership of farms as bearing on economic efficiency and social and political conditions. Lectures, assigned readings, reports on special topics and quiz.

23. ECONOMICS OF FORESTRY AND IRRIGATION

MR. COULTER

Three credits (three hours per week)

First semester

Open to those who have completed course 1 or course 2.

Preliminary survey of forest controls and forest influences. In this connection, special attention to the progress of the national irrigation works in relation to economic development, land laws, and land tenure. Location and value of the extant forest resources of the United States. Intensive study of the forest industry, covering: (1) history and processes, (2) employees, (3) division into stages (logging, sawing, etc.), (4) internal organization of each, (5) transportation and marketing, (6) economic relations to other industries, (8) share of forest products in foreign commerce, (9) economic necessity of a scientific system of forestry. Lectures, assigned reading, and reports.

EDUCATION

Course 1 in philosophy and courses 1 and 2 in education are specified as necessary for the University Teacher's Certificate. One other three-hour course for a half year is required for this certificate, and is elective from the courses in education.

1. HISTORY OF EDUCATION TO THE REFORMATION

ASSISTANT PROFESSOR SWIFT

Three credits (three hours per week)

First semester

Open to juniors and seniors.

An introductory study in the history of education conducted by means of lectures, assigned readings, discussions and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigation, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other

social institutions. Attention will be given especially to an examination of the schools of Greece and of Rome, the education of the early Christian centuries, the development of different types of schools in Medieval times, the rise of the university and of the humanistic schools of the Renaissance.

2. **HISTORY OF MODERN EDUCATION** ASSISTANT PROFESSOR SWIFT
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have taken course 1 in education.
 A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

ENTOMOLOGY

1. **GENERAL ENTOMOLOGY** PROFESSOR WASHBURN
 (Three hours per week) First semester
 Open to freshmen registered in division B.
 Structure and classification of insects. The dissection of type, life history and habits of leading forms. Each student is required to make a collection of at least fifty insects.
2. **ECONOMIC ENTOMOLOGY** PROFESSOR WASHBURN AND MR. RUGGLES
 Three credits, elective (three hours per week) First semester
 Lectures upon injurious insects of Minnesota and best methods of combating the same. The use of insecticides and spraying machinery. Beneficial insects.
3. **FOREST ENTOMOLOGY** PROFESSOR WASHBURN AND MR. RUGGLES
 Three credits (six hours per week) First semester
 The students in this course must have a thorough, practical training in elementary entomology and economic entomology in order to put into practical use in field work the principles to be learned in both of these courses. The student will be directed in a special study of insects affecting the forest and will be encouraged in doing field work, collecting, identifying, and in the life history of forest insects.
 Open only to students in the forestry course.
4. **COMPARATIVE ANATOMY AND HISTOLOGY OF INSECTS** MR. RUGGLES
 Three credits, elective (six hours per week)
 A detailed study of structure of representatives of different orders of insects.
5. **ELEMENTS OF BEE KEEPING** PROFESSOR WASHBURN
 One credit Second semester
 Open to juniors and seniors.
 One lecture a week and work in apiary during spring term.
 Offered to those qualified for the work.
6. **SPECIAL PROBLEMS (elective)** PROFESSOR WASHBURN
 For graduate students only First or second semester

FARM STRUCTURES AND FARM MECHANICS

1. **CARPENTRY** MR. WHITE
 (Four hours per week) First semester
 Open to freshmen registered in division B.
 Instruction is given by means of lectures on the care and use of the common carpenter tools, such as should be found on every farm; also on methods of farm building construction, framing, laying out rafters, stairways, estimating building material, painting, etc. In the carpenter shop students are

required to make such exercises as will give them some practice in using carpenter tools. They are required to make mortise joints, splices, drawing boards, hammer handles, eveners, cup-boards, etc.

Each student is required to file his own saws, sharpen his planes, chisels, etc., and to lay out rafters for buildings.

2. BLACKSMITHING

(Four hours per week)

MR. DREW

Second semester

Open to freshmen registered in division B.

The students are instructed in the management of the forge and fire, and in bending, shaping and welding iron and steel. They are required to make links, rings, hooks, bolts, clevises, whiffle-tree-irons, tongs, cold chisels, punches, in short to become familiar with all the operations necessary to enable them to do their own repair work when they return to the farm. Particular attention is given to rapid and accurate welding and to the shaping and tempering of steel tools. The forges used are such as any farmer can make for himself, and each student is taught to make his own tools, so that he will be able to furnish his shop with very little outlay.

3. CARPENTRY FOR FORESTERS

Three credits

PROFESSOR W. BOSS

Second semester

Open to juniors.

Lectures and practice work on care and use of tools used in lumbering; saw filing; construction of camp buildings, bridges, etc.

4. FARM STRUCTURES

Three credits (three hours per week)

PROFESSOR W. BOSS

Second semester

Open to juniors.

Lectures and practice work are given in laying out plans for farm buildings. The questions of location, size, convenience, methods of construction, materials, heating systems, water systems, ventilation, sewage disposal, painting, durability, cost, etc., are discussed.

5. FARM STRUCTURES

Three credits (three hours per week)

PROFESSOR W. BOSS

First semester

Open to seniors.

The practical application of principles given in course 1.

Each student selects an imaginary or real farm and makes drawings showing location of buildings, drives, yards, fences, etc., paying particular attention to locating each building properly and planning them so as best to meet the requirements of each individual farm and the means at hand for erecting them. Specifications and estimates of cost of buildings are also made.

6. FARM STRUCTURES

Three credits (three hours per week)

PROFESSOR W. BOSS

Second semester

Open to juniors.

Lectures and practice work in drawing. Location of farm buildings, drives, yards, etc., architectural designing, the study of plans, fittings and equipment; heating systems, ventilation, floors and wood work, painting and decorations.

7. FARM STRUCTURES

Three credits (three hours per week)

PROFESSOR W. BOSS

First or second semester

Open to juniors and seniors.

The practical application of the principles outlined in course 3.

Each student is required to lay out plans for an imaginary or real house, paying particular attention to location, sanitary conditions, heating, ventilating and general convenience.

FORESTRY

1. **GENERAL FORESTRY** ASSISTANT PROFESSOR DETWILER
 Three credits (three hours per week) First semester
 Open to freshmen.
 This course is intended to give the student an outline of the possibilities of forestry work and an idea of the forestry problems to be solved in this country. Considerable attention will be devoted to the sylvics of the trees suited to Minnesota climate; the establishment of nurseries; the planting and care of windbreaks and groves, especially on the prairies.
2. **SYLVICS** ASSISTANT PROFESSOR DETWILER
 Three credits First semester
 Open to juniors.
 The study of the fundamental principles which form the basis of silviculture, including the relation of forests to soil, climate and other factors which influence tree growth. Methods of silvical research, characteristics and habits of important trees. Lectures and collateral reading.
3. **SYLVICULTURE** ASSISTANT PROFESSOR DETWILER
 Four credits Second semester
 Open to juniors.
 Methods of crop production and reproduction; care and improvement of the forest; silvicultural practice in the United States and abroad. Special work in silvicultural studies and the making of forest descriptions. Lectures, assigned reading and field work.
4. **FOREST PLANTING** ASSISTANT PROFESSOR DETWILER
 One credit.
 Open to seniors. (In Itasca Park)
 Preparation of planting plans and notes on results of planting. Practical instruction in seed collecting, nursery practice, sowing and planting. Lectures and field work.
5. **MENSURATION** ASSISTANT PROFESSOR CHEYNEY
 Four credits
 Open to juniors. (In Itasca Park)
 Determination of the rate of growth and volume of single trees and of stands; construction of volume and yield tables. The measurement of logs and lumber. Compilation of statistics. Lectures, recitations and problems.
6. **SURVEYING** PROFESSOR STEWART
 Four credits
 Open to juniors. (In Itasca Park)
 Theory of land surveying and drill in the use and the care of the transit, level, plane table, etc. The student will be made familiar with approved methods of field work, particularly in running boundaries, topographic surveying and reconnaissance. Lectures and field work.
7. **PROTECTION** ASSISTANT PROFESSOR CHEYNEY
 Three credits First semester
 Open to juniors.
 Practical measures for the protection of forests against fire, insects, grazing, etc. Protection of water right and regulations of stream flow. Lectures and field work.
8. **GAME PROTECTION AND FISH CULTURE**
 One credit.
 Open to seniors (nine weeks) Second semester
 Habits, range, usefulness and manner of protecting the important large and small game, fish and birds of the United States.

9. **FOREST MANAGEMENT** **ASSISTANT PROFESSOR CHEYNEY**
 Three credits **First semester**
 Open to seniors.
 This course includes forest valuation. The calculation of soil rent, forest rent and the value of growing stock; the values of even and uneven stands; the different methods of managing forest properties and the principles underlying them. Lectures, assigned reading and problems.
10. **LUMBERING** **ASSISTANT PROFESSOR CHEYNEY**
 Three credits **First semester**
 Open to seniors.
 History of logging in the United States, together with the different methods used in the different forest regions; cruising, location of camps, building of roads, felling trees, skidding and transportation of the logs from the woods to the mill. The marketing and utilization are treated elsewhere. In connection with this course, the student is obliged to hand in a lumbering report based on data collected by him at some lumbering camp. This requires an excursion of about two weeks. Lectures and collateral reading.
11. **FORESTS OF THE UNITED STATES AND WORLD** **ASSISTANT PROFESSOR DETWILER**
 One credit
 Open to sophomores.
 Closely follows forest physiography and metrology. Includes a brief description of the forests of the world including their distribution and chief characteristics. Detailed description of the forests of the United States with types and species of the different regions. Lectures and collateral reading.
12. **LUMBER GRADING** **ASSISTANT PROFESSOR CHEYNEY**
 (Nine weeks) **Second semester**
 Open to juniors.
 The part which it plays in the lumber industry; methods and organization leading to uniformity. Study of the rules adopted by the Northern Pine Manufacturers' Association. Several excursions are made to the mills of Minneapolis to study grades and grading in the yards.
13. **MAPPING** **PROFESSOR STEWART**
 Two credits
 Open to seniors. **(In Itasca Park)**
 Completion of a set of boundary, topographic, type, block and stand maps in connection with and based on data from working plans.
14. **ADMINISTRATION** **ASSISTANT PROFESSOR DETWILER**
 One credit
 Open to seniors. **(In Itasca Park)**
 A study of the organizations necessary for the management of forest properties; federal, state, corporation and private.
15. **FOREIGN FORESTRY** **PROFESSOR GREEN**
 One credit
 Open to seniors. **(In Itasca Park)**
 The development and present status of forestry in foreign civilized countries. Lectures.
16. **SEMINARY** **ASSISTANT PROFESSORS CHEYNEY AND DETWILER**
 Three credits **First semester**
 Open to seniors.
 This is not, as the term generally implies, a class for the prosecution of original research work, but for the purpose of systematically reviewing the whole field of forestry and studying the concrete application of the different branches. Assigned questions and problems. Discussions.

17. **WORKING PLANS** ASSISTANT PROFESSOR CHEYNEY
One credit
Open to seniors. (In Itasca Park)
This subject will be given in the woods. A course of lectures paralleling the field work will deal with the principles and methods involved. Each class will be obliged to work out a complete plan including surveys, silvicultural plans, estimating, yield tables, maps and systems of management. Lectures and field work.
18. **THINNING** ASSISTANT PROFESSOR DETWILER
Four credits
Open to juniors. (In Itasca Park)
This course is designed to teach the student the principles underlying thinning operations and the tending of forests. Besides the class room work, there will be two months of field lectures and actual practice in marking. Lectures and field work.
19. **PACKING**
Open to juniors. (In Itasca Park)
Demonstration and practice under direction in the packing of wagons, boats, canoes, pack animals and pack sacks. Field lectures and practice.
20. **ROAD BUILDING** PROFESSOR STEWART
Open to juniors. (In Itasca Park)
Elementary principles of the science of road building. Rough field methods of laying out and constructing wood roads and trails; building bridges, etc. Lectures and field work.
21. **ESTIMATING TIMBER**
Two credits
Open to seniors (In Itasca Park)
Duties of the cruiser, his methods, and the value of his results. Particular attention will be given to the best methods for use in a forest reconnaissance. Lectures and field practice.
22. **MARKET** ASSISTANT PROFESSOR CHEYNEY
One credit
Open to seniors (first nine weeks) Second semester
General studies of the lumber market. Conditions of the market at present and methods which would tend to its betterment and greater stability in the future. The demands of the market and how they are supplied.
23. **SAW MILLS** ASSISTANT PROFESSOR CHEYNEY
One credit
Open to seniors (first nine weeks) Second semester
Capital invested, machinery used, methods, cost of operation, and output of portable and stationary mills. Studies will be made of the modern mills of Minneapolis.
24. **FOREST ECONOMICS AND FOREST LAW** PROFESSOR GREEN
One credit
Open to sophomores.
The development of forestry in the United States and European countries; the forest conditions here and abroad and their effect upon the lumber industry; forest policies of different governments. Laws in regard to contracts, water rights, roads, fences, legal papers. Legal measures for the prevention of trespass and fire. Text book, lectures and recitations.

FRENCH

1. **BEGINNING FRENCH** ASSISTANT PROFESSORS ANDRIST AND FRELIN,
MADAM BERTIN
Ten credits (five hours per week) Both semesters
Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; not credited toward a minor in French.
Fraser and Squair's *French Grammar and Reader*; modern texts.

2. INTERMEDIATE FRENCH

ASSISTANT PROFESSOR FRELIN AND

MADAM BERTIN

Both semesters

Six credits (three hours per week)

Open to sophomores, juniors and seniors who have completed course 1; both semesters must be completed before credit is given for the first semester.

François Advanced French Prose Composition; modern texts will be read, including some of the works of Coppée, Mérimée, Daudet, Scribe, etc.

GEOLOGY

1. GENERAL GEOLOGY

PROFESSOR HALL

Three credits (three hours per week)

First semester

Open to juniors and seniors.

Comprises: (1) geodynamics, in which are set forth the phenomena of the atmosphere, water, heat, gravity, and plants and animals as geologic agents; (2) structural geology, wherein stratification, displacement and veining of rock masses are described; (3) physiographic geology, pointing out prominent earth features and inquiring into the causes producing them; (4) an outline of historical geology. Conferences and lectures illustrated by photographs, maps, profiles, and lantern slides.

2. ESSENTIALS OF PHYSICAL GEOGRAPHY

ASSISTANT PROFESSOR LENHERTS

Three credits (three hours per week)

First semester

Open to juniors and seniors.

Discussion of the principles of earth sculpture and description of the structural features of continents, with special reference to the ethnic movements and commercial activities of mankind.

3. INDUSTRIAL GEOGRAPHY

ASSISTANT PROFESSOR LENHERTS

Three credits (three hours per week)

Second semester

Open to juniors and seniors who have completed course 1 or 2.

The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and dominating climatic characters of the several agricultural regions of the continent; a discussion of the geography of industries as they have grown up within the past 100 years and their dependence upon physiographic conditions; a study of local industries effected through excursions and reports. A brief survey of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.

4. ELEMENTS OF METEOROLOGY

ASSISTANT PROFESSOR LENHERTS

Three credits (three hours per week)

Second semester

Open to juniors and seniors who have completed course 1 or 2.

The general principles of meteorology are treated, embracing the properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally. The conditions of climatic changes are studied and the influence of physiographic conditions are discussed. Text-book, lectures, and reference reading.

5. GEOGRAPHY AND GEOLOGY OF MINNESOTA

PROFESSOR HALL

Three credits (three hours per week)

Second semester

Open to juniors and seniors who have completed course 1.

(a) The physical geography of the state in its relations to geological history and industrial development. (b) A study of the principles and facts of pre-Cambrian geology as exemplified within the state and the extension of these into general application. (c) The present problems of the state in agriculture, drainage, water power, mining, quarrying, etc., are considered in some detail.

MINERALOGY

1. **ELEMENTS OF MINERALOGY** PROFESSOR HALL AND MR. GROUT
 Three credits (six hours per week) First semester
 Open to sophomores, juniors and seniors; the laboratory fee is three dollars.
 (a) The morphology of minerals; the physical and chemical characters of minerals, with demonstrations; a study of the native elements and of economic minerals; the basis of classification. (b) laboratory work; this consists of practice in the recognition of crystal forms, tests illustrating the range of minerals, and the application of chemical and blowpipe analysis to the identification of species.

GERMAN

1. **BEGINNING** PROFESSOR SCHLENKER, ASSISTANT PROFESSORS WILKIN AND JUERGENSEN, MR. BURKHARD, AND MR. WILLIAMS
 Ten credits (five hours per week) Both semesters
 Open to all, but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester.
 Pronunciation, grammar, conversation, and composition; selected reading in easy prose and verse.
2. **INTERMEDIATE** PROFESSOR SCHLENKER, MR. BURKHARD, AND MR. WILLIAMS
 Six credits (three hours per week) Both semesters
 Open to those who have completed course 1 or its equivalent; both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 5. It should be followed by course 6 or course 7. Students who obtain credit for this course cannot receive credit also for either course 3 or course 4.
 First semester, selections from modern narrative and descriptive prose; selected lyrics and ballads. Second semester, a drama of Lessing, Goethe, or Schiller.
3. **SCIENTIFIC INTERMEDIATE** ASSISTANT PROFESSOR JUERGENSEN
 Six credits (three hours per week) Both semesters
 Open to all who have completed course 1; both semesters must be completed before credit is given for the first semester.
 First semester: *Hodge's German Science Reader* (or equivalent).
 Second semester: *Brandt and Day's German Scientific Reading*.
 This course aims to give the student a reading knowledge of German for use in scientific studies.

HORTICULTURE

1. **FRUIT GROWING** MR. CADY
 (Two hours) First semester
 Open to freshmen registered in division B.
 Geography of fruit growing, tilling, fertilizing and irrigation of lands; seed sowing; pollination; diseases and injurious insects and their prevention; storing, harvesting and marketing fruits.
 Lectures and text book.
2. **VEGETABLE GARDENING** MR. KOHLER
 (Three hours) half semester Second semester
 Open to freshmen registered in division B.
 Geography of vegetable growing, tilling, fertilizing and irrigation of lands; seed sowing; vegetables under glass; pollination; diseases and their prevention; storing, harvesting and marketing of vegetables. Lectures and text books.
3. **PLANT PROPAGATION** PROFESSOR GREEN AND MR. CADY
 Last nine weeks Second semester
 Open to freshmen registered in division B.
 Development of cultivated varieties of plants and seed testing; propagation of plants by seed, cutting, grafting and budding;

the work of the class room is illustrated by the orchards, nurseries, forest plantation, gardens and greenhouses on the grounds of the experiment station, and by visits to commercial nurseries and greenhouses nearby.

4. **NURSERY WORK** **MR. CADY**
 (Four hours per week) Second semester
 Open to sophomores.
 Seedage, layerage, cuttage, graftage, planting, pruning, thinning, storage of nursery stock; tillage of nursery lands; insects and diseases injurious to the nurseries and their prevention. Lectures and practice work.
5. **GREENHOUSE MANAGEMENT AND FLORICULTURE** **PROFESSOR GREEN AND MR. CADY**
 Three credits (elective)
 Open to juniors and seniors elective.
 Lectures and laboratory work. Greenhouse construction and management; temperature; soil; watering; benches; propagation; prevention of diseases and extermination of insects in greenhouses; rest and growth periods of plants; plants for greenhouse cultivation.
6. **LANDSCAPE GARDENING** **PROFESSOR GREEN**
 Three credits (elective), (given in 1908-9) Second semester
 Open to juniors and seniors elective.
 A general course in the practice and principles of landscape gardening, special attention being given to the planting of small grounds.
7. **PLANT BREEDING** **PROFESSOR GREEN**
 Three credits (elective), (given in 1909-10) Second semester
 Open to juniors and seniors elective.
 Lectures and laboratory work. The fact and philosophy of variation; crossing of plants and origination of domestic varieties.
8. **SYSTEMATIC POMOLOGY** **MR. KOHLER**
 Three credits (six hours per week) First semester
 Open to juniors and seniors elective.
 Description and classification of the varieties of the various fruits with special reference to those varieties adapted to Minnesota; the identification of varieties; judging of fruits; fruit sections of the country; and a brief study of the fruits not taken up in course 1 with their introduction, cultivation, propagation and distribution.

MATHEMATICS

1. **SECOND PART HIGHER ALGEBRA** **MR. ROE**
 (Three hours per week) First semester
 Open to freshmen registered in division A.
 For those not having an entrance credit in this subject.
2. **SOLID GEOMETRY** **MR. ROE**
 (Three hours per week) First semester
 For those not having an entrance credit.
3. **PLANE TRIGONOMETRY** **MR. ROE**
 (Three hours per week) half semester Second semester
 Open to sophomores.
 Functions of plane trigonometry, use of logarithm tables and numerous applications.
4. **FARM ACCOUNTS** **MR. VYE**
 Two credits, elective (four hours per week) Second semester
 Open to freshmen registered in division B.
 The work in accounts is applied to the transactions which the student meets in the various duties on the farm. He is taught to keep his accounts that he may know at any time the profit or

loss of any department of his business and is thus enabled to plan intelligently.

Lectures are given on special features of farm business such as purchasing, selling, co-operation, banks, insurance, commercial, law and methods of obtaining accurate information concerning the farm.

PSYCHOLOGY

1. **INTRODUCTORY PSYCHOLOGY** PROFESSOR WILDE AND ASSISTANTS
 Three credits (three hours per week) First semester
 This course is required for all advanced work in Psychology and for the teacher's certificate; it also serves as an introduction to the courses in philosophy. The purpose of the course is to acquaint the student with the general characteristics and laws of mental life and with the aims and methods of modern psychology. The work involves text books, lectures and essays.
2. **EDUCATIONAL PSYCHOLOGY** ASSISTANT PROFESSOR MINER
 Three credits (three hours per week) Second semester
 Open only to sophomores, juniors and seniors who have completed course 1. The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

PHYSICS

1. **AGRICULTURAL PHYSICS** PROFESSOR STEWART
 Three credits (six hours per week) Second semester
 Open to sophomores.
 This work is carried on by class demonstrations, reference work, discussions and note book records, a part of the work being done by the student in the laboratory.
 Among the questions treated are the molecular nature of matter, diffusion of liquids and gases, capillarity, etc.; the nature of force, specific gravity, the laws of motion, fluid pressure, weather forecasting, pumps, eveners, pulleys, the principles of draft in the horse, the various causes of draft in wagons and the fundamentals of electricity; rock-forming minerals, their physical properties and composition and their effect in the soil on texture and fertility; specific gravity determinations are made and pore-space calculated and tested and the bearings of these matters on productiveness are taken up.

RHETORIC

1. **RHETORIC** PROFESSOR LANSING
 Six credits (three hours per week) First and second semesters
 Open to all freshmen who have passed the entrance test in English. This course includes the study of formal rhetoric, the writing of compositions, and the study and analysis of masterpieces of prose.
2. **RHETORIC** PROFESSOR LANSING
 Six credits (three hours per week) First and second semesters
 Open to sophomores. The course consists of a study of the short story and of the essay and forms of public address. The writing of compositions and the keeping of a note book form a greater part of the work.

VETERINARY

1. **VETERINARY WORK** PROFESSOR REYNOLDS
 (Three hours per week) First semester
 Open to freshmen registered in division B.
 During the freshman year class B students take up a course of study in veterinary medicine, the purpose of which is to fit them for intelligent care of their farm stock. In this course the teaching is done by means of text book, lectures, reviews,

and clinical work at the hospital maintained for this purpose. Lectures are illustrated by means of stereopticon, charts, manikin of horse, skeletons and various other appliances. The work covers the following subjects elementary anatomy; elementary pathology; cause and prevention of diseases; diagnosis and treatment of common diseases; examination for soundness; and a final short course on common medicines, studying their effects, uses and doses. At the hospital clinics, students are enabled to learn the elements of diagnosis for common diseases and forms of lameness.

2. **ANATOMY** PROFESSOR REYNOLDS
 One and a half credits (three hours per week) first nine weeks
 (elective) Second semester
 Open to juniors and seniors.
 Comparative anatomy of the digestive organs, dissection, collateral reading and recitation. Chauveau's *Comparative Anatomy* is used for reference and comparison.

3. **BODY NUTRITION** PROFESSOR REYNOLDS
 One and one half credits (three hours per week) nine weeks
 (elective) Second semester
 Open to juniors and seniors.
 This is an advanced study of the veterinary physiology of digestion, taking up the digestive fluids, nervous mechanism of digestion, absorption and digestion of grains and fodders. It also includes a study of body nutrition, body income and expenditures, sources of heat supply and heat loss, and metabolism. Veterinary Physiology, by F. Smith, is used as a text and guide for this work but students are required to do collateral reading.

4. **ADVANCED ANATOMY** PROFESSOR REYNOLDS
 One and one-half credits (six hours per week) first nine weeks
 (elective) Second semester
 Open to juniors and seniors.
 This course deals with the anatomy of locomotion. The bones, articulations and muscles involved in locomotion and conformation are studied by text book- dissection and collateral reading. Shoeing, diagnosis and treatment of common forms of lameness may be included in course 3. Strangeway's *Veterinary Anatomy* is used as a text book and Chauveau for reference.

5. **COMMON DISEASES** PROFESSOR REYNOLDS
 One and one-half credits (three hours per week) Second semester
 Open to juniors and seniors as an elective.
 This course covers causes, prevention, and deals with common and serious diseases of domestic animals.

ZOOLOGY

1. **GENERAL ZOOLOGY** PROFESSOR SIGERFOOS, ASSISTANT PROFESSOR
OESTLUND, BROWN, DOWNEY, AND MR. JOHNSON
 Six credits (six hours per week) Both semesters
 Open to all; the laboratory fee is three dollars per semester.
 This course is a comparative study of the principles of structure, physiology, and development in animals. In the laboratory a brief study of insects and the dissection of the frog are used as a practical introduction to the course. Then follow a study of cell structure and cell division, a systematic study of representatives of the chief phyla or branches of the animal kingdom, and a study of the elements of embryology as illustrated by the development of the star fish and chick. Lectures, quizzes, and laboratory work. Text-book required: Hertwig's *Manual of Zoology*.

2. **MORPHOLOGY OF INVERTEBRATES** PROFESSOR SIGERFOOS AND MR. JOHNSON
 Six credits (six hours per week) Both semesters
 Open to those who have completed course 1; both semesters must

be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

The object of this course is to familiarize the student with the methods and principles of zoology through an intensive study of two or three groups of animals and to acquaint him with the minor phyla not considered in course one. During the year 1908-9 the Protozoa and Crustacea will be the groups especially taken up.

3. ESSENTIALS OF HISTOLOGY AND EMBRYOLOGY PROFESSOR NACHTRIEB
AND ASSISTANT PROFESSOR DOWNEY

Six credits (six hours per week) Both semesters

Open to those who have completed course 1; the laboratory fee is three dollars per semester.

In this course are taken up the development and minute structure of the animal as an organism built up of tissues combined into organs, and the student is given practice in general methods, technique, and the use of apparatus. The course prepares directly for most of the advanced courses. Lectures, quizzes, and laboratory work.

4. COMPARATIVE ANATOMY OF VERTEBRATES ASSISTANT PROFESSOR BROWN
AND MR. JOHNSON

Six credits (six hours per week) Both semesters

Open to those who have completed course 1 or its equivalent; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.

The first semester's work is based upon a study of chordates, cartilaginous and bony fishes and all classes up to mammalia; the second semester to a detailed study of the cat and comparative studies of the rabbit, sheep, and man. Lectures, quizzes, and laboratory work. Required text-books: Davidson's *Mammalian Anatomy* and Burkholder's *Anatomy of the Brain*.

5. GENERAL PHYSIOLOGY PROFESSOR NACHTRIEB

Six credits (three hours per week) Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.

In the first semester are considered the physical, structural, and functional features of living substance; the cell, present conditions, and expressions of life; and the theories of the origin of life and death. Demonstrations and simple experiments constitute an essential part of the course in both semesters.

In the second semester the life of the cell is considered in its relations to that of other cells and the course is concluded with special reference to the teaching of physiology in high schools.

THE SCHOOL OF AGRICULTURE

The School of Agriculture

FACULTY

CYRUS NORTHROP, LL.D., *President.*

E. W. RANDALL, *Dean.*

DEXTER D. MAYNE, *Principal, Economics, Practicums.*

SAMUEL B. GREEN, B. S., *Horticulture, Forestry.*

J. A. VYE, *Secretary and Treasurer, Accounts.*

HARRY SNYDER, B. S., *Agricultural Chemistry, Soils.*

T. L. HAECKER, *Dairy Husbandry, Animal Nutrition.*

M. H. REYNOLDS, M. D., V. M., *Veterinary Science.*

J. M. DREW, *Registrar, Blacksmithing, Poultry.*

ANDREW BOSS, *Agriculture, Animal Husbandry.*

WILLIAM BOSS, *Carpentry, Power Machinery.*

JUNIATA L. SHEPPERD, M.A., *Cooking, Laundering, Home Economy.*

MARGARET BLAIR, *Sewing, Household Art.*

MARY L. BULL, *Cooking, Laundering.*

JOHN A. HUMMEL, B. Agr., *Agricultural Chemistry.*

FREDERICK L. WASHBURN, M. A., *Zoology, Entomology.*

COATES P. BULL, B. Agr., *Agriculture.*

LEROY CADY, B. S. in Agr., *Horticulture.*

C. C. LIPP, D. V. M., *Comparative Physiology.*

EDITH SNELL, B. L., *Algebra, Geometry.*

D. A. GAUMNITZ, M. Agr., *Animal Husbandry.*

A. D. WILSON, B. S., in Agr., *Agriculture.*

A. G. RUGGLES, M. A., *Entomology.*

W. L. OSWALD, *Agricultural Botany.*

KARL A. MACHETANZ, B. A., *Director of Gymnasium, History.*

ALVAH M. BULL, *Drawing, Farm Buildings.*

ESTELLE COOK, *English.*

GRACE B. WHITRIDGE, *Physical Training.*

FANNIE C. BOUTELLE, *Preceptress, Social Culture.*

A. L. EWING, M.S., *Agricultural Physics.*

D. B. HOWELL, Ph. B., *Mathematics.*

E. C. PARKER, B. S., in Agr., *Agriculture.*

EDWARD SIGERFOOS, Ph. B., Capt. 5th U. S. Infantry, *Military Science and Tactics.*

E. G. CHEYNEY, A. B., *Forestry.*

L. B. BASSETT, *Farm Machinery.*

ETHEL E. BUSH, *English*

EDITH STAPLES, *Asst. in Sewing.*

JOSEPHINE CRAIG, *Domestic Chemistry.*

AGNES ERICSON, *Assistant in Chemistry.*

MARTHA B. MOORHEAD, M. D., *Lecturer in Domestic Hygiene.*

MINNIE CHERMAK, *Assistant in Cooking.*

MARY L. COFFIN, *Music.*

GERTRUDE V. COLLINS, *Farm Accounts.*

S. B. DETWILER, B. S., in Agr., *Forestry.*

W. H. FRAZIER, B. S., *Agricultural Chemistry.*

E. M. FREEMAN, Ph. D., *Agricultural Botany.*

AVIS HALL, *Assistant in Sewing.*

A. R. KOHLER, B. S. A., *Assistant in Vegetable Gardening.*

EVA MCCABE, *Assistant in Sewing.*

A. J. MCGUIRE, B. Agr., *Assistant in Dairying.*

C. SCHROEDER, B. S. in Agr., *Assistant in Animal Husbandry.*

BLANCHE STRUNK, *Assistant in Drawing.*

H. J. THOM, *Assistant in Blacksmithing.*

Committees, School of Agriculture

LIBRARY: Mayne, Reynolds, Snyder, McIntyre, Green.

CATALOG: Vye, Snyder, Drew.

MILITARY DRILL: Sigerfoos, Green, Haecker.

ENTERTAINMENT: Mayne, Boutelle, A. Boss.

HEALTH: Reynolds, Mayne, Boutelle, Washburn.

DAIRY SCHOOL: Haecker, Wm. Boss, Snyder.

SHORT COURSE FOR FARMERS: Mayne, A. Boss, Green.

AUDITING: Reynolds, Hummel.

ATHLETICS: Green, Mayne, Machetanz

The School of Agriculture

TIME OF OPENING.

The School of Agriculture will open Monday, October 5th, 1908 and close March 24th, 1909. The fall term closes at 4:30 p. m., Wednesday, December 23rd, and the winter term begins Monday, January 4th, 1909.

Instruction begins promptly at the opening of each term, and students are required to be present the first day of the term and to remain until the close of the term.

Students are advised to correspond with the registrar of the school, J. M. Drew, St. Anthony Park, St. Paul, Minnesota, prior to coming to the institution and to make the necessary preliminary arrangements for registration. Students registered in the fall term will not be received after the second day of the winter term, unless a reasonable excuse is presented for the delay.

LOCATION.

The School of Agriculture is located on University Farm, St. Anthony Park, St. Paul, Minnesota, about midway between the business portions of the cities of St. Paul and Minneapolis. Directions for reaching the school are given on page 7. The School of Agriculture is a part of the University of Minnesota and is governed by the University Board of Regents.

PURPOSE.

The School of Agriculture was organized in 1888 with the object of giving a practical education to the young men and women who are unable to pursue the full college course in agriculture. It offers a practical course of study designed to fit young men and young women for successful farm life, and aims to give to its students the necessary preparation for useful citizenship.

COURSE OF STUDY.

The course of study offered covers a wide range of subjects and is largely technical in character, but provision is made for some instruction in English and mathematics. The course is briefly outlined on pages 11 and 12. Instruction is given in the work shop, laboratories, barns and fields, as well as in the class room. The course requires three winters of six months each for completion, and is co-educational. Much of the work is taken in common by the young men and the young women. Some of the subjects, such as blacksmithing, carpentry, field work, handling grain and machinery are taken by the young men, while the young women pursue cooking, sewing, laundering and household art. The methods of

instruction tend to educate students toward the farm instead of away from it, and to develop in them a love for farm life by showing them its possibilities. In this respect the school has been very successful as over 80 per cent of its graduates continue agricultural pursuits.

HOW TO GET TO THE SCHOOL.

Check all baggage to St. Paul or Minneapolis.

Monday and Tuesday, October 5th and 6th, members of the Y. M. C. A., wearing lettered badges, will be at the Union Station in St. Paul, and at the Union, Milwaukee, Great Western, Soo and St. Louis Stations in Minneapolis, to meet and direct new students. Take the Como-Harriet or Como-Hopkins car from either St. Paul or Minneapolis and get off at Commonwealth avenue. A charge of 25 cents is made for transporting trunks at the opening of the school. No charge is made for the return of the baggage, at the close of school, provided it is ready to go on the days assigned.

ADMISSION.

All male students are required to have had six months' farm practice before entrance.

Parents are advised not to send pupils under fifteen years of age, unless they are unusually proficient in the common branches.

Students who have completed eighth grade work in the common schools are admitted without examination.

Applicants for admission who do not have state certificates or county diplomas showing completion of eighth grade work should send to the registrar for certificates of admission which, when properly filled out by former teachers or superintendents, will be accepted in place of entrance examinations.

Applicants whose home schools do not afford complete instruction in the common branches may be admitted with not more than two conditions which must be removed according to instructions given the student upon admission.

Students from city or grade schools will not be admitted before finishing eighth grade work nor until their former school records have been passed upon by the registrar. These records must be presented at least three weeks prior to the opening of the school.

State High School Board Certificates are accepted for work in English, physiology, algebra, geometry and civics.

HOME LIFE ON THE CAMPUS.

The life of the students while attending the School of Agriculture is

Students residing in the school dormitories are not allowed to leave the grounds without permission.

The home life of each student is carefully guarded, and everything done to promote a healthful moral atmosphere.

The use of tobacco and of spirituous liquors of all kinds is strictly forbidden. No person will be admitted as a student who is known to have the cigarette habit.

Upon entrance students are provided with a copy of the rules and regulations to which they are required to subscribe.

Any one not in accord with these restrictions and not willing to lend a hand toward a strong moral growth should not come to the School of Agriculture.

CLASSIFICATION OF STUDENTS.

No student with incomplete C or preparatory work, or more than one incomplete B subject will be classified as an A, excepting high school graduates.

No student with incomplete preparatory work, or more than one incomplete C subject, excepting high school graduates, will be classified as a B.

No student with incomplete C or preparatory work will be made a commissioned military officer.

STUDENTS IN DORMITORIES.

The Principal of the School of Agriculture has charge of the boys in their dormitory and social life, and the Preceptress has charge of the girls in their dormitory and social life.

From 8:15 a. m. to 4:30 p. m. students not at recitations or chapel are expected to be in their rooms or the library studying or reading, also after 7 in the evening.

The rooms shall at all times be quiet, especially in the evening, so that no student may be disturbed.

The cadet officers shall make daily inspection of the boys' dormitories, under proper supervision of the instructors.

HOLIDAYS.

On Lincoln's birthday, February 12th, the regular classes of the last two periods in the forenoon will be omitted and a suitable program substituted.

Washington's birthday, February 22nd, will be observed by appro-

REQUIREMENTS FOR GRADUATION.

First—The completion of the prescribed course of study with an honorable standing in department.

Second—An essay of not less than one thousand words upon a topic connected with agriculture or home economics.

Third—For young men, a practical experience in field work at the University farm or elsewhere, as shall appear in reports received from responsible sources.

FEES.

With the exception of an entrance fee of \$5 to residents, and \$10 to non residents, the school makes no charge.

EXPENSES.

The necessary expenses for the year do not exceed \$85. This amount does not include the cost of the required military suit for the young men, traveling and personal expense.

The cost to the student for board, heat, light and laundry is the actual cost of maintaining the table (including management), and caring for the buildings. This has not exceeded \$3 per week. Each month's board is paid in advance. The buildings are all lighted by electric lights and warmed by steam. The sleeping rooms are each furnished with a bedstead, mattress, dressing bureau, chair and table.

No deductions in charges are made for absence of less than four days. If students are compelled to be absent for that length of time they are allowed half rates if they make arrangements before leaving.

Text books are furnished at a rental of \$2 per year to students who do not desire to purchase.

A gymnasium fee of 25 cents per term is charged all students.

Each student is required to pay for breakage of apparatus used in practical work.

A competent nurse is kept on the ground to care for the sick. To meet this expense each student pays one dollar per term.

For the purpose of supplying, calcimining and painting the sleeping rooms, a reserve fund is created by assessing each one occupying them \$2.00.

A deposit of \$5 is required of each student, as a guaranty for the return of all books and other articles borrowed.

On entering school the student makes a payment of \$12 board; \$5 deposit; \$2 book rent and reading room; \$1 maintaining nurse; \$5 entrance fee; 2 reserve fund; 25 cents gymnasium fee; total \$27.25.

All male students are required to provide themselves with the prescribed uniform, which consists of navy blue blouse, trousers and cap,

and is as neat and economical a dress as the student can obtain. The suit complete, to measure, is furnished under special contract for \$14.50.

Each student provides four sheets, one pair of blankets, one quilt, one bed spread, one pillow, three pillow cases, towels, napkins, comb and brushes.

An assignment of rooms will be made at 9 a. m., March 20th, which will hold good until 8 p. m., the first day of the following school year. Students wishing to retain their rooms, after vacation, must be on hand when the second term opens, or pay one-half the price of board and room for the time they are late. Students arriving after the dormitories are filled are compelled to find rooms elsewhere, but are allowed a rebate of \$3 per month.

STUDENTS' DEBATING SOCIETIES.

Societies for the purpose of improvement in elocution and debate, and for obtaining instruction in the form of lectures, give excellent opportunities for entertainment and culture.

Each student should associate himself with one of these societies as early in his course as possible.

LECTURE COURSE.

During the school year, a lecture and entertainment course, usually consisting of six lectures and concerts, is given in the chapel at a cost of seventy-five cents for the series. These entertainments are strictly high grade, and furnish a pleasant relaxation from school work, as well as mental stimulus.

The following program, which was provided during the past year, shows the general character of the entertainments:

Monday, October 21, "America Facing the Far East".....	Dr. John M. Driver
Friday, November 15, "O, Brave New World" of Texas (Illus.).....	Gilbert McClure
Saturday, December 14, Music.....	Lyrle Glee Club
Friday, November 22, "Seeing Things" (Illustrated).....	Pitt Parker
Thursday, January 9, "The Story of Dugan".....	Judge Willis Brown
Monday, February 3, Music.....	Hungarian Orchestra
Wednesday, March 11, "Sunshine and Awkwardness".....	S. W. Gillilan

STUDENTS' CHRISTIAN ASSOCIATIONS.

The Young Men's and the Young Women's Christian Associations have for their objects, social fellowship and moral and spiritual development. To this end two receptions are held each year, and Bible classes are held Sunday mornings at 8:30. A general religious service is held each Sunday at 3 p. m., and a mid-week prayer meeting each Wednesday, at 6:30 p. m. The associations are non-sectarian, so that all students may find in them an opportunity for Christian activity and mutual helpfulness.

Course of Study

FIRST (C) YEAR

FIRST TERM

Agricultural botany [5]

*Drawing [2]

Music [2]

Farm Mathematics [5]

*Blacksmithing [2]

*Carpentry [2]

Military Drill [2]

Agriculture [3]

Gymnasium [2]

*Practicums [2]

or

*Cooking [2]

Physical training [2]

*Sewing [3]

Social culture [1]

Field agriculture [3]

SECOND TERM

Agricultural botany [5]

English [5]

Music or literary society work [2]

Comparative physiology [5]

Study of breeds [5]

*Carpentry [2]

*Drawing (farm buildings) [2]

*Blacksmithing [2]

Military drill [2]

Gymnasium [2]

*Practicums [2]

or

*Laundering [2]

*Drawing (farm houses) [2]

Physical training [2]

*Farm Accounts [2]

SECOND (B) YEAR

FIRST TERM

English [2]

Agricultural physics [5]

Dairy chemistry [2]

*Dairy husbandry [2½]	{	Dairy lectures
		Dairy practice
		Dairy breeds

Fruit growing [3]

Music [2]

*Farm Accounts [4]

*Stock judging [1]

Breeding [2]

Military drill [2]

Gymnasium [1]

*Farm Accounts [2]

*Cooking [2]

Household art [1]

Physical training [2]

*Sewing [2]

SECOND TERM

English [2]

Agricultural chemistry [5]

*Dairy husbandry [2½]	{	Dairy stock lectures
		Dairy practice
		Dairy feeding

Music [2]

Agricultural physics [5]

Vegetable gardening [3]

Field crops [5]

Military drill [2]

Gymnasium [1]

or

*Cooking [2]

Home management [1]

Physical training [2]

*Sewing [2]

COURSE OF STUDY—Continued

THIRD (A) YEAR

FIRST TERM

Agricultural chemistry [7]
 Forestry [3]
 Entomology and zoology [3]
 Poultry [3]
 Algebra [5] Optional

Handling grain & machinery [1]	} or {	*Cooking [2]
*Veterinary science [2½]		*Sewing [2]
Gymnasium [1]		Music [2]
Music or military drill [2]		

SECOND TERM

Civics or geometry [4]
 Plant propagation [8]
 Entomology and zoology [3]
 Algebra [5] Optional

Dressing and curing meats [1]	} or {	Meats [1]
*Stock judging [1]		Home economy [1]
Feeding [3]		*Cooking [3]
Soils and fertilizers [5]		Domestic chemistry [3]
*Veterinary science [2½]		*Sewing [3]
		Domestic Hygiene [1]

*Figures in brackets indicate the number of periods per week in which the subject is pursued. All work in subjects marked thus * extends through double time in the daily program.

ASSEMBLY.

On each school day at 11:40 a. m. the students assemble in the chapel. After the opening exercises brief talks are given by the principal, members of the faculty, or invited guests.

During the year the list of speakers includes prominent state and national officials, business men, particularly those connected with the agricultural industries, professional men, prominent clergymen of all denominations, educators from other institutions, and successful farmers. It has been found that this plan gives to the students an opportunity to hear men of prominence discuss a wide range of topics, many of which relate to rural and agricultural problems.

Members of the graduating class at times present essays, and discuss topics as assigned.

Courses of Instruction

AGRICULTURAL BOTANY.

This subject is taught with special reference to its bearing upon the every day problems that present themselves to the farmer and gardener. It is profusely illustrated with plants and flowers from the greenhouses and nursery. Some instruction is given in the use of the compound microscope. Students are thus enabled to study intelligently, in an elementary way, the tissues of plants. By this means they get a clear idea of the general principles of plant structure and vegetable physiology.

AGRICULTURAL CHEMISTRY.

In agricultural chemistry one term is given to the study of the elements and compounds which are of most importance in agriculture. This work is planned to prepare the student for intelligent study of the subject of the chemistry of foods, soils and fertilizers, and at the same time to familiarize him with the more important chemical changes which take place in every-day life. Laboratory practice forms a prominent feature of the work. In the chemistry of foods, the composition of plant and animal bodies, the chemistry of the plant and of its food and growth, the chemistry of animal nutrition, digestibility and value of foods, and the laws governing the economic uses of foods, are some of the subjects considered. The composition and the utilization of farm crops for food purposes, and the application of the principles of chemistry to plant and animal life, form the basis of this work.

AGRICULTURAL PHYSICS.

In this department it is the aim to enlist the student's interest in a more keen appreciation of the principles that underlie the practices of his vocation. To this end the facts with which he is already somewhat familiar are used to reach the fundamental law. For example, from his knowledge of the relation of weight to bulk in grains, soil and water, he is led to a knowledge of volume, mass, density, weight, force, draft, specific gravity, and fluid pressure. In the laboratory he makes definite determinations along these lines. Likewise the somewhat vague and indefinite notions the young people have from their use of pulleys, eveners and other farm machinery, form fitting stepping stones to definite mathematical results readily reached by them under proper guidance.

The varied questions of soil physics, soil formation, the movements of water and air thru soil, soil temperatures, soil grains and granules, and pore space, are matters studied from the practical side and used as avenues to far reaching laws.

AGRICULTURE.

It is purposed in teaching this subject to cover the elementary principles governing soils, field and farm management. The work covers the origin, formation, and cultivation of soils; the movement and control of soil moisture; selecting and planning farms; subdividing fields; drainage; irrigation; roads; fences; buildings; water supply; groves and wind breaks; farm life; the relations of science to agriculture; a general consideration of farming as a business; and methods of farming.

ALGEBRA.

Algebra is optional during the third year. This work covers Wells' New Higher Algebra through simple equations. Special attention is given to literal notation, negative numbers, the equation and factoring.

BLACKSMITHING.

The students are instructed in the management of the forge and fire, and in bending, shaping and welding iron and steel. They are required to make links, rings, hooks, bolts, clevises, whiffletree-irons, tongs, cold-chisels, punches, in short, to become familiar with all the operations necessary to enable them to do their own repair work when they return to the farm. Particular attention is given to rapid and accurate welding and to the shaping and tempering of steel tools. The forges used are such as any farmer can make for himself, and each student is taught to make his own tools, so that he will be able to furnish his shop with very little outlay.

BREEDING.

Students receive instruction in the principles that govern breeding; on the influences that affect heredity and in the care and management of breeding stock. Pedigree receives careful consideration, and each student is required to make out pedigrees of two or more pure bred animals. They are also required to become familiar with methods of keeping live stock records of all kinds.

CARPENTRY.

Instruction is given by means of lectures on the care and use of the common carpenter tools, such as should be found on every farm; also on methods of farm building construction, framing, laying out rafters, stairways, estimating building material, painting, etc. In the carpenter shop students are required to make such exercises as will give them some practice in using carpenter tools. They are required to make mortise joints, splices, drawing boards, hammer handles, eveners, cupboards, etc.

Each student is required to file his own saws, sharpen his planes, chisels, etc., and to lay out rafters for buildings.

CIVICS.

During the last term of the course students receive instruction in this science, and graduate with a good understanding of the origin, necessity, nature and various forms of government, and the machinery employed to carry on public works, establish justice and provide for the common defense; of the organization and management of local institutions—the town, the village, the city and the county; the manner in which states are created and the affairs administered; the three departments—legislative, judicial and executive—and the functions of each; the interdependence of the state and its citizens, as well as the powers and obligations of each, by due attention to which the state may be strengthened and the condition of its citizens ameliorated.

The relations of the state to the general government, the constitution and the power it confers, and the provisions for amendments, are taught. The more important principles of commercial law, including contracts, agency, partnership, corporations and commercial paper, receive attention. Instruction is also given in the United States method of surveying public lands.

COMPARATIVE PHYSIOLOGY.

During the first year students take one term of applied physiology. This is an effort to connect technical physiology with the necessities of every day life. The work includes a study of the general plan and structure of the body and the various individual tissues of which it is composed; also sources of heat and energy, digestion and the relation of food materials to the various tissues of the body. Considerable attention is given to diseased and innutritious foods, food adulterations and narcotics. The circulation is studied with special reference to the relation of the blood and lymph to tissue nutrition and tissue waste.

Accidents, including poisoning, are studied for the purpose of giving a practical knowledge of what to do in emergencies. Considerable attention is given to the subject of clothing, the various materials in use being considered with reference to fitness for special purposes. Some time is also given to the study of common physiology, of the organs of circulation, digestion, respiration, nervous system, and the relations of bacteria to the common diseases, especially such diseases as consumption, typhoid fever, etc. A brief study is also given to the subject of digestion in the lower animals.

The class work is illustrated by means of large charts, skeletons, manikins, and dissections. Important points of difference between human and animal

physiology are pointed out in preparation for the third year's work in the veterinary class. Matters of home and personal hygiene are interwoven with the physiology work.

COOKING.

Cooking extends through five terms of the curriculum. The subjects covered in each term are as stated below:

First term. C year: Furniture and equipment needed in a home kitchen; best methods of managing kitchen work, caring for kitchen and dining room utensils, furniture, etc.; the place of measuring and weighing in cookery; the preparation and serving of vegetables, cereals and bread.

First term, B year: Cooking is again taken up, the special topics being preservation of fruits and vegetables by canning, preserving, pickling and jelly making. The selection, preparation and serving of meats of all kinds is also considered. A sufficient amount of practical work is given in each case to illustrate the principles brought out. A special study of table service is begun during this term and extends through the year, a practice dinner being given by a portion of the class in the class dining room each month.

Second term, B year: Eggs are considered as to selection, preservation, food value, different ways of cooking and serving. The preparation and serving of soups and beverages is considered together with their food value. The subject of salads is considered in a similar way.

First term, A year: This is devoted to the marketing and care of food. The preparation and serving of dairy foods and made-over dishes and dishes for invalids receive special attention.

Second term, A year: This is devoted to the preparation and serving of desserts and to the study of food rations, dietaries, bills of fare, confections, etc. A free use is made of the U. S. Bulletins during the year in the hope of arousing a greater interest in the food question.

DAIRY CHEMISTRY.

The chemical and allied changes which take place in the handling of milk and its manufacture into butter and cheese, and the application of these principles to the production of milk and its products form the basis of this work.

DAIRY HUSBANDRY.

Farm dairy lectures.—A course of lectures is given in farm dairying, giving instruction in the care of milk and utensils, explaining the principles involved in creaming milk by the gravity and centrifugal processes and giving full instruction in regard to running farm separators and the manufacture of butter and cheese in the farm dairy.

Dairy practice.—Students receive instruction in the most advanced methods of creaming milk, ripening cream, churning, working and packing butter, the manufacture of sweet curd cheese, and measuring the value of milk by the Babcock test and lactometer. This practice work begins the third week of the first term and continues through the school year.

Dairy stock.—During the last half of the first term students receive instruction in regard to the characteristics of the various breeds of dairy cattle, their origin and comparative adaptability for the dairy. Lectures are given upon the points desirable in animals intended for the dairy. The students have practice work in judging dairy stock.

Feeding.—During the second term lectures are given covering both the scientific and practical phases underlying the principles of feeding. Practice work is given in compounding rations and estimating the comparative value of food stuffs.

DOMESTIC CHEMISTRY.

The composition of human foods and their combinations to form balanced rations, dietary studies of families, cost and value of foods, chemical changes and losses in the cooking and preparation of foods, cereal food products, animal food products, fruits, adulterations of foods and their detection, fuels, soaps, disinfectants, dye stuffs and colors, composition of common household utensils, the household water supply, preparation of home-made baking powders, bakers' chemicals, the composition, food value and characteristics of tea, coffee, chocolate, cocoa, molasses, honey, vinegar, spices, flavors, extracts, etc., the grading and testing of wheat flour, the chemistry of bread making and household sanitation, form the essential parts of this work.

Laboratory practice is given in study of the composition and detecting adulteration of different foods, such as milk, cream, butter, oleomargarine, lard, cheese, coffee, tea, vinegar, catsups, jellies, flavors and extracts, baking powders, cereal breakfast foods and flour. The aim of this work is to give students an idea of composition, uses and value of food materials and the part chemistry takes in sanitation and household affairs.

DOMESTIC HYGIENE.

Several lectures by a physician will be given upon maidenhood, maternity and infancy. These special lectures will be supplemented by the regular lectures which consider the health of the family as dependent upon pure food, pure water, personal cleanliness and proper habits as well as upon heredity. The aim is to impress the truth that a knowledge of and obedience to the laws of hygiene are essential to the preservation as well as the restoration of health.

DRAWING.

The student is taught the practical value of drawing for the purpose of designing and arranging buildings, machinery, etc. He makes drawings of the shop exercises, then works from his own drawings, thereby learning the application

Designs are made for dwellings, barns, outbuildings, and machinery. As practical subjects for their designs, students are requested to bring from home data for plans of buildings needed on their farms. Estimates are made of the amount of material required and cost of construction.

DRESSING AND CURING MEATS.

The instruction given the boys consists of demonstration lectures on the preparation of meat for farm use. They are required in addition to take two weeks' practice in dressing, cutting and curing such meat as is likely to be used on the farm. Work is also given them in selecting and judging fat stock, and in judging dressed meats.

ENGLISH.

(C) Applicants for admission to the "C" class in English should be familiar with the inflections of nouns, pronouns and verbs, the definitions and classifications of phrases and clauses, and the common case constructions. The first year's work consists of the study of Mayne's "Modern Business English," with almost daily practice in writing the simpler forms of composition. Two periods a week are given to the study of one of the classics.

(B) The second year's work consists of Maxwell and Smith's Writing in English. Once a week a short essay is prepared and submitted for criticism.

(A) At the option of the English Department a series of literary programs will be presented in chapel by the members of the graduating class. The numbers include abstracts of leading magazine articles, biographical sketches, book reviews and selections from fiction. Special prominence is given to authors depicting American life.

ENTOMOLOGY AND ZOOLOGY.

The class in entomology receives instruction of a practical nature. The course is divided as follows:

Classification of insects; habits and life histories of injurious forms with special attention to insect pests found in Minnesota. The nature of different insecticides and methods of application are discussed. The student spends some time in becoming acquainted with the appearance and habits of beneficial insects. Each student must collect fifty insects representing at least twenty-five different kinds.

The four-footed pests of the farm—rabbits, gophers, squirrels, etc., as well as injurious and beneficial birds, are also studied.

FARM ACCOUNTS.

that he may know at any time the profit or loss of any department of his business, and is thus enabled to plan intelligently.

FARM ARITHMETIC.

Instruction in this subject consists of the application of its principles to all kinds of farm problems where measurements of material, extension, capacity, etc., are required. The student is prepared also to handle with ease the mathematics of the technical courses in the school.

FEEDING.

The principles of feeding as applied to the production of horses, beef cattle, sheep and swine are taught. Special attention is given to the choice and preparation of food for animals during different periods of growth and during the time they are used for breeding purposes and to summer feeding and pasturage. Practice is given in compounding rations that will include in the best manner the food stuffs commonly produced on the farm. Practical lessons in feeding are given at the barns under the supervision of an experienced feeder. Each student thus learns the requirements of each class of stock.

FIELD AGRICULTURE.

This work consists of a study of those portions of geology relating to soil formation; effect of the glaciers on the soils of Minnesota; origin of soils in the various agricultural regions of Minnesota; classification of soils; soil moisture and soil tillage; land areas and the planning of fields and farms; the classes of field crops as grain, grass, and cultivated crops; the relation of these crops to each other in a systematic rotation and in their relation to soil fertility; the origin, distribution, and uses of cereal crops and other field crops.

FIELD CROPS.

Students are admitted to this subject after having finished the work of agriculture and receive instruction as follows:

Crop rotations, farm management, and planning farms under various conditions; production and care of farm manures and green manure crops; fertility as related to weeds, crop production and profits; preparation of land; planting, cultivating, harvesting, storing, and marketing of grains, roots, fiber, sugar, grass and other forage crops; meadows and pastures; treatment of field crop diseases; selecting, breeding and judging seed.

FORESTRY.

Includes the consideration of the formation and care of wind breaks and shelter belts; the laying out and planting of home grounds; discussion of the hardiness, habits and value of our native and introduced trees; and the methods of propagating them.

FRUIT GROWING.

Fruit growing is taught with reference to raising fruit for market and in the home garden.

GEOMETRY.

Geometry is offered in the second term of the third year as an elective in place of civics to those who wish to prepare for a college course. This work covers the first two books of Wells' Essentials of Plane Geometry.

GYMNASIUM WORK.

The gymnasium is a large, well lighted, two story brick building. It is well supplied with heavy apparatus for general gymnastic and athletic exercises, together with such appliances as are necessary for the development of a symmetrical body. Besides being fitted up with the finest apparatus, it possesses space and equipment for sprinting, pole vaulting, hurdling, high and broad jumping, shot putting, etc.

Class work in physical training is required of all undergraduate young men not excused on account of physical disability. Courses are offered on the heavy apparatus, in corrective work, class drills and athletic training. In addition to the regular class drill, a certain part of which consists of training in athletic sports, the school is represented by a strong basket ball team, a track athletic team, hand ball team, and an indoor tennis team.

HANDLING GRAINS AND MACHINERY.

Practical suggestions for the best methods of harvesting, shocking, stacking and storing of cereal grains; adaptation of the various kinds of machinery with reference to the soil, weeds and seasons are given; adjustment with special reference to durability, convenience in manipulation, etc.

HOME ECONOMY.

The lectures are a study not only of the just proportion between expenditure and income, but of definite proportion in the expenditures made for existence, comfort, culture and philanthropy. A study is made of the sources of income, especially of the income from the farm in the form of house, food and luxuries; the purchase of necessities such as household stores and furnishings is considered from the standpoint of the suitable and desirability shown of saving something to be used in securing things which promote culture and comfort. The relation of cash and credit to cost is also considered. Attention is given to saving and forms of investment, a book account and the use of a check book. Students are required to submit an account setting forth in detail the use of a certain named income expended in the support of a family for one year, embracing not only every item of necessary home expense, but also an outlay made for travel, luxuries, accident, sickness, or other emergencies. The habit of keeping a household account is calculated to strengthen the judgment in the wise use of money.

HOME MANAGEMENT.

The subject includes both housekeeping and home-making, and the instruction is based on the belief that housekeeping is a business as important as it is difficult, and that home-making is the noblest form of human endeavor. The care of the house and household belongings, of the food, utensils, plumbing, etc., as well as the general ordering of family life, are considered in their relation to an adequate plan for home management. To start the student in the right way of becoming mistress of the business of housekeeping and home-making is the end sought. The practical benefit to be derived from the knowledge students gain in the cookery, sewing, dairy, laundry and other classes, is emphasized and shown in its relation to an adequate plan for the daily program for the home.

HOUSEHOLD ART.

Lectures are given upon house and grounds, noting the distinctive character of the country home; the sanitary conditions involved in the selection of the site of the house; also the influence of the outlook; an elementary study of architecture in connection with planning a house which will provide "a place for everything" required in housekeeping operations and family life; instruction in the fundamental value of color, form and design; training the taste and emphasizing the laws of hygiene that should influence the selection of materials and styles in the finishings and furnishings of the house.

LAUNDERING.

Second term, C. year: The aim is to give the students a knowledge of the best means of cleansing all fabrics with little injury to the cloth or color. Approved methods of cleansing by the use of chemicals, as removing grease spots, stains, etc., are given.

LIBRARY.

The agricultural library now contains ten thousand books and about seven thousand pamphlets, including reports and bulletins. Aside from the large number of pamphlets and other publications of the different agricultural institutions and societies, a large number of the most important technical and

agricultural magazines are kept on file, bringing together all the agricultural literature of any importance.

LITERARY SOCIETY WORK.

Any student belonging to a recognized literary society of the school may receive credit in the course of study for the work done therein by registering at the beginning of the term, and submitting to the teacher in English all essays to be read by such student before the literary society and rehearsing to said instructor all essays, readings, or recitations with a view to correct pronounciation, expression, etc.

MEATS.

The instruction given to the girls in the subject of meats pertains to the selection and value of different classes of meat, and to the best methods of curing and preserving.

MILITARY DRILL.

Under the provisions of the Act of Congress of 1862, establishing the "Land Grant Colleges" of the United States, instruction in Military Science and Tactics is required to be given at all colleges which are its beneficiaries. For this purpose the United States Government furnishes the Department of Agriculture with the necessary arms and equipments, and details an officer of the regular army to take charge of military science and tactics.

All male students of classes B. and C. not physically unfit are required to attend military drill. For the A. Class drill is an elective.

Military instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor and obedience to lawful authority, as well as to familiarize students with battalions, manoeuvres, guards and the theoretical and practical use of firearms.

The officers and non-commissioned officers are required to be good students in the other departments, soldier-like in the performance of their duties, exemplary in their general deportment and able to pass a creditable examination in drill regulations.

In general, the officers are selected from the "A" class; sergeants and corporals from the "B" class.

MUSIC.

Instruction in this department takes in elementary theory, sight singing and music history. The course is planned to give the students a basis for musical appreciation and culture, as well as a practical knowledge of musical forms and terms. Special attention is given to habits of breath control and enunciation of words, and a thorough system of solfeggio is employed.

For students whose voices and training will admit them, there is offered a chorus class, consisting of a mixed chorus, a women's chorus, and a male chorus. This offers special advantages for musical development and experience.

A student orchestra is maintained, which assists in public exercises given by the school.

PHYSICAL TRAINING.

The work done in this department aims at symmetry, co-ordination and control rather than mere physical strength. It is planned to improve the functional activity of the body and to counteract and correct tendencies toward correct development, especially those resulting from the artificial life of civilization. The work of the beginning class is free hand, based upon Swedish principles, and directed especially to deep breathing, correct carriage posture. The work of the advanced class includes light apparatus and thetic movements for grace and suppleness in action. Vigorous games are given to both classes.

PLANT PROPAGATION.

In this subject the principles underlying the development of cultivated varieties of plants and seed testing are taught; also the propagation of plants by seed, cuttings, grafting and budding. The work of the class room is illustrated by

trated by the orchards, nurseries, forest plantations, gardens and greenhouses on the grounds of the experiment station, and by visits to commercial nurseries and greenhouses near by.

POULTRY.

The instruction in this subject will include the following topics: History and characteristics in the leading breeds of poultry; breeding, rearing and management of fowls for eggs and for the market; planning, building and arrangement of poultry houses; managing incubators and brooders. A model poultry house, containing pens of the most improved breeds, incubator cellar, work-room, etc., has been provided, where experimental work and practical instruction are carried on.

PRACTICUMS.

During the first year the young men spend four hours each week in a series of lessons and exercises in the barns and fields, taking up such practical lines of work as land surveying, laying tile drains, building fence, setting up farm machinery, soldering, pipe-fitting, splicing rope, making rope halters, etc.

SEWING.

Instruction is given in the principles and use of healthful and appropriate clothing and in the needlework of the home. The course provides for five terms' work. During the first term instruction is given in the elements of sewing, including different stitches, seams, hems and the various kinds of mending; also practical talks on the use and care of the sewing basket, touching the history of the various implements used, and upon the textiles used—cotton, wool, linen and silk.

In the second year instruction is given in cutting and making plain garments, drafting underwear, shirt waists and cotton dresses—taught by a simple method in which only a tape line and square are used.

In the third year the more difficult work of dressmaking is taken up, pattern drafting, cutting and fitting dresses. A practical aid to the work in this subject is offered by a museum of exhibits. These exhibits are kept in the class rooms and include primitive and modern sewing implements, weaving processes and the various cloth fibers.

Lectures are given on the utilitarian and art values of various textiles, and in connection with the selection of materials practical lessons in shopping are given. Attention is paid to harmony in color.

SOCIAL CULTURE.

A course of lectures is given on the usages of society, including manners, behavior, the voice, conversation, forms of address, invitations, etc. Suggestions are made in reference to reading, literary taste and the choice of books. Special stress is given to the thought that the family life ought to be the highest expression of good society, and that next to the power of thinking correctly is the power of approaching others with ease and speaking with tactful directness.

SOILS AND FERTILIZERS.

Some of the topics studied are: The formation of soils, adaptability of crops to different kinds of soils, chemical composition of soils, physical analysis of soils, interpretation of soil analysis, the judging, rating and scaling of soils, alkali soils, acid soils, humus and its relations to soil fertility, the factors governing the increase and decrease of the nitrogen of the soil, farm manures—their composition and uses, and their action upon soils—green manures, commercial fertilizers, special purpose fertilizers and their use; the influence of different methods of cultivation upon the fertility of the soil, the food requirements of farm crops, the rotation of crops as affecting the fertility of the soil, the income and outgo of fertility from farms where different systems of farming are followed, the general principles of soil exhaustion and soil improvement and the various factors which affect the fertility of soils. The class room work is supplemented by laboratory practice.

STOCK JUDGING.

Score cards are used to an extent sufficient to familiarize students with that method of judging, and special efforts are made to do systematic and

closely critical work in the selection of animals representative of the breeds and for breeding purposes. Living specimens are used and rings made up for the student contests in stock judging. In connection with the work in dressing and curing meats, the judgment passed on live animals for the block is verified by score cards, judgment of the dressed carcasses and by actual block tests. These tests are made by the students and bring out the percentage of meat in each commercial cut of the carcass. The quality of meat is passed upon in this connection by experts, and a careful report made to ascertain the type of animals best calculated for the production of the most meat of the best quality.

STUDY OF BREEDS.

The market classes of horses, cattle, sheep, and swine are taken up briefly to bring out the form, quality, and condition desirable and common to the different classes. This is followed in each class of stock with the most common and valuable breeds for the state. These are studied carefully as regards their characteristics and origination, and as to their adaptability to the different Minnesota conditions. This work is illustrated with stock from herds and flocks maintained at University Farm for this purpose.

VEGETABLE GARDENING.

Vegetable gardening embraces the study of garden tillage, irrigation, and rotation of crops; transplanting; formation and care of hotbeds; study of garden insects; and the growth of various vegetable crops.

VETERINARY SCIENCE.

During the A year the student takes up a course of study in veterinary medicine, the purpose of which is to fit him for intelligent care of his farm stock. In this course the teaching is done by means of lectures and reviews and clinical work at the hospital maintained for this purpose. Lectures are illustrated by means of stereopticon charts, manikin of horse, skeleton of horse, and various other appliances.

The work covers the following subjects: Elementary anatomy; elementary pathology; cause and prevention of diseases, diagnosis and treatment of common diseases; examination for soundness; and a final short course on common medicines; studying their effects, uses and doses. At the hospital clinics students are enabled to examine and care for a variety of cases and to learn the elements of diagnosis for the more common diseases and forms of lameness.

Intermediate Year

For Graduates of the School of Agriculture who wish to enter the College of Agriculture

The course of study in the School of Agriculture extends over three years, and the school year is six months long. This does not give sufficient time for preparation for college work, and it has been found necessary to supplement the course offered in the School of Agriculture by an additional year's work in general academic branches. The subjects offered in the intermediate year can be taken elsewhere in any accredited high school before entering the School of Agriculture. This intermediate year enables graduates of the School of Agriculture to enter the College of Agriculture on the same basis of preparation as students enter other departments of the University. English and mathematics are given prominence in the intermediate year.

The following prescribed course, or its equivalent taken in some other school, is required of graduates of the School of Agriculture, who desire to gain admission to the College of Agriculture:

FIRST TERM.

Elementary algebra [5]
Plane geometry [5]
English [5]
General History [4]

SECOND TERM.

Higher algebra [5]
Solid geometry [5]
English [5]
Economics [4]

The courses in mathematics for the intermediate year cover Wells' New Higher Algebra from simultaneous equations to logarithms; Downey's Higher Algebra, Part I. and Wells' Essentials of Plane Geometry, beginning with Book III. The work preliminary to these courses is done by the student in the A year in the School of Agriculture.

Students who have completed higher algebra and plane geometry in the A year of the School of Agriculture may be admitted to the freshman class in the College of Agriculture conditioned in solid geometry and English; these conditions must be removed during the freshman year.

The course in English extends through both terms. Two periods a week are devoted to composition, with Scott & Denny's Composition-Rhetoric as a text-book, and three to the study of literature, which will also be made the basis of considerable written work. The characteris-

tic works of the following authors will be studied: Shakespeare, Bacon, Milton, Addison, Gray, Goldsmith, Burns, Wordsworth, Lamb, Macaulay, Ruskin, Browning and Tennyson. Individual members will be assigned readings from various other authors.

CROOKSTON SCHOOL OF AGRICULTURE.

The Crookston School of Agriculture Crookston, Minn., established by the legislature of 1905, is in active operation and offers to the young men and young women of the Red River Valley a three years' course in practical farming and home-making. The school year for 1908-9 will open October 13, 1908 and close April 6, 1909. For further information address Crookston School of Agriculture, Crookston, Minn.

THE FARM STUDENTS' REVIEW.

The Farm Students' Review is a monthly agricultural paper owned and published by the Alumni Association of the School of Agriculture. The paper is intended to be a medium by which the former students of this institution shall be kept in touch with each other and also with the School and Experiment Station. It also endeavors to bring the farmers throughout the state generally, into closer connection with the institution and to this end strives to present the latest progress in experimental work at the various Stations. It is the official organ of the Alumni Association and of the Farmers' Club.

THE FARMERS' CLUB.

The Farmers' Club of Minnesota is an organization composed of students and ex-students and members of the faculty of the School of Agriculture. Any one who has ever registered as a student in the regular dairy or short course or who is or has been a teacher in the School of Agriculture, is eligible to membership. The objects of the Association are to foster and strengthen the ties between the School and its former students and to extend the work of the School and Experiment Station among the farmers of the state. To this end the members of the State Club have formed County Clubs which hold annual meetings for the benefit of the farmers of the community. To quote from the annual address of its president: "The School of Agriculture is an institution of the farmers, for the farmers, and supported in a large measure by them, and each student of the School should use his knowledge to better the conditions about him. The State has invested from one to several hundred dollars in his education and expects to realize on that investment by the knowledge which he will distribute."

Dairy School

FACULTY

CYRUS NORTHROP, LL.D., *President.*

E. W. RANDALL, *Dean.*

T. L. HAECKER, *Professor of Dairy Husbandry and Animal Nutrition.*

J. A. VYE, *Creamery Records and Accounts.*

HARRY SNYDER, B.S., *Dairy Chemistry.*

M. H. REYNOLDS, M.D., V.M., *Diseases of the Dairy Cow.*

J. M. DREW, *Forage, Farm Buildings.*

WILLIAM BOSS, *Instructor in Practical Engineering.*

H. L. RUSSELL, Ph.D., *Dairy Bacteriology.*

E. K. SLATER, *Creamery Management.*

H. T. SONDERGAARD, *Chief Instructor.*

I. O. DYBEVICK, *Instructor in Creamery.*

E. L. ALLEN, *Instructor in Cultures and Starters.*

A. W. PARKIN, *Instructor in Cheesemaking.*

C. B. MOAK, *Instructor in Dairy Laboratory.*

M. P. MORTENSON, *Assistant in Cultures and Starters.*

J. C. JOSLIN, *Assistant in Creamery.*

The next session of the Dairy School will open Monday, November 16th, 1908, and continue four weeks.

This course is designed to furnish persons who are actually engaged in the manufacture of butter and cheese in creameries and cheese factories an opportunity to become more skilled in their work and also to study the many problems which have a direct bearing upon the dairy industry. Recognizing the fact that such persons cannot be away from business for a long period, the term has been so arranged that the time of each student is fully occupied by lectures and actual work in the creamery training room every hour of every working day of the term.

The rapid growth of the dairy industry in the Northwest calls for constant enlargement in equipments for dairy hall.

With each succeeding year, as dairy products manufactured in our creameries take higher rank in quality and finish, the character of the

instruction given must be of high order. To meet these requirements the training rooms are each year equipped with the best apparatus, and the corps of instructors is composed of the most skillful workmen and best instructors.

No pains will be spared to maintain the high standard which the school has attained. Each member of the faculty has special qualifications for the duties to which he has been assigned. The lecture course and practical instruction are arranged with special reference to giving the greatest amount of training and practice possible in a four weeks' session.

Instruction is divided into seven courses:

- 1st. Lectures covering the entire field of dairy husbandry.
- 2d. Practical work daily in the butter room.
- 3d. Practical work daily in the cheese room, where the manufacture of flats, cheddars, Swiss, brick, Edam and Gouda cheese is carried on.
- 4th. Practice work in the laboratory, examining milk, making daily composite tests, and the pasteurization of milk and cream.
- 5th. Practical engineering, steam fitting and plumbing.
- 6th. Practical work in factory bookkeeping.
- 7th. Practical work with cultures and starters.

I.—LECTURES.

The course of sixty lectures furnishes in a plain and concise form the most valuable information for those who are interested in any branch of agriculture, covering, as it does, the most important points in the breeding, rearing, feeding and general management of dairy stock, the economical production of milk, growing and preserving of forage and grain crops, the management of meadows and pastures, management of barns, stables and yards, construction of silos, co-operative dairying, creamery and cheese factory management, judging and marketing dairy products, the chemistry of milk, dairy bacteriology, engineering, animal hygiene and treatment of the common diseases of the dairy cow.

II.—BUTTER MAKING.

The running of separators; ripening and churning of cream; how to ripen cream to secure best flavor; how to churn, wash and salt butter so as to avoid specks and mottles; to secure good grain and best methods of preparing for market—are some of the points which receive special attention. As all creamery men should be able to judge butter from a commercial standpoint, students are trained daily in the art of scoring butter by the score card.

III.—CHEESE MAKING.

The work in the cheese room is conducted on a large scale, including the manufacture of several brands of fancy cheese. The fact that there is a demand for these at highly remunerative prices has induced the Regents to provide the necessary means for carrying on this work.

A complete record of every step taken is required of each student. Here is a good opportunity for cheese makers to meet, investigate new methods, make experiments on doubtful points, compare notes, and thus gather in a few weeks knowledge that otherwise would take years to acquire.

IV.—MILK TESTING.

It has been found that the value of milk for both butter and cheese is measured by the per cent of fat content, and nearly all our factories and creameries now base the payment for milk on the fat content. It is therefore necessary for every factoryman to familiarize himself with the best methods

of milk testing. The chemist gives a general outline of the work, but in order that each student may have thorough training in milk testing daily exercise is given. Steam turbine and hand power machines and other apparatus are provided and operated in the laboratory.

The pure and wholesome milk and cream supply for our cities is a matter of vital importance, and there is great need for improved methods of handling milk intended for this purpose. To meet this, milk and cream pasteurizing apparatus of the latest and most improved makes has been provided for the dairy school, and a few advanced students will be given instruction in this work.

V.—MOTIVE POWER.

The work in engineering consists of practical talks on the construction, care and management of creamery engines and boilers, pumps, injectors, heaters, etc., and work in the practice room.

In the practice room are provided an eight horse power, simple, slide-valve engine, three types of boiler feed pumps, two types of deep well pumps, one injector, two milk pumps and a steam gauge, which the students have the privilege of examining and operating. Instruction is also given in pipe fitting, placing shafting, babbitting bearings, soldering, etc.

It is the aim to make this work as practical as possible. Questions of interest on the subject are freely discussed.

VI.—FACTORY BOOKKEEPING.

All the essential features of factory accounting from the receipt of the milk to the returns in net proceeds are thoroughly considered. Paying for the milk according to the fat content, or otherwise, is fully explained. The students do, in books provided, the actual one month's accounting of a creamery.

VII.—STARTERS AND CULTURES.

Since all students who are admitted to the school have had some experience in the routine work of running separators and since the most important part in butter making is the art of uniformly making a product having a fine flavor and good keeping qualities, special attention is given to cultures, starters and pasteurization. Constant additions will be made to the equipment needed to make this course inviting to those who wish to fit themselves for masters of the art of creamery butter making.

REQUIREMENTS FOR ADMISSION.

Experience has shown that students who have had some practical training in the creamery or cheese factory before coming to the dairy school are, as a rule, the ones who are able to make the most of the course; it is therefore required that persons who intend to take this course shall have had at least one season's experience before coming to the school. No entrance examination is required.

EXPENSE.

A registration fee of \$15 is required of each student. Students can board in either city and reach the school by street car, or board can be secured near the school for from \$3.50 to \$4.00 per week. Each student is required to supply himself with two white suits, including caps, to be

DAIRY CERTIFICATES.

The Regents will grant dairy certificates to students who have taken the course and passed a satisfactory examination and in addition have demonstrated by at least one year's work in a factory that they have acquired special skill in the art of butter and cheese making, and are thoroughly qualified to take charge of a creamery or cheese factory.

To reach the school from either St. Paul or Minneapolis, take the Como-Hopkins or Como-Harriet street car and get off at Commonwealth avenue.

Address applications for admission to T. L. Haecker, St. Anthony
D. L. St. Paul Minn.

Short Course for Farmers

FACULTY

CYRUS NORTHROP, LL.D., *President.*

E. W. RANDALL, *Dean.*

SAMUEL B. GREEN, B.S., *Horticulture, Forestry.*

J. A. VYE, *Business Methods.*

HARRY SNYDER, B.S., *Agricultural Chemistry, Soils.*

T. L. HAECKER, *Dairy Husbandry and Animal Nutrition.*

M. H. REYNOLDS, M.D., V.M., *Veterinary Science.*

J. M. DREW, *Poultry, Workshop Hints.*

A. BOSS, *Live Stock, Dressing and Curing Meats.*

WM. BOSS, *Farm Mechanics.*

F. L. WASHBURN, M.A., *Insect Enemies.*

E. M. FREEMAN, Ph. D., *Plant Diseases.*

COATES P. BULL, B.Agr., *Farm Implements, Grains.*

W. L. OSWALD, *Farm Botany.*

D. D. MAYNE, *Parliamentary Practice.*

A. L. EWING, M.S., *Farm Physics.*

JUNIATA L. SHEPPERD, *Domestic Science.*

MARGARET BLAIR, *Domestic Art.*

This course of instruction is provided by the faculty of the School and College of Agriculture to meet the needs of men and women of mature years who are actively interested in the work of the farm.

The next term will be open on Friday, Jan. 15th, and will continue for four weeks, closing on Friday, Feb. 12th, 1909.

This is a lecture course, covering the more important branches of agriculture, horticulture, live stock, farm botany, farm chemistry, entomology, poultry, dairying, etc. Special instruction will be given in the judging of grains, soils, and animals.

A series of lectures especially fitted to the needs of farmers' wives will be given. The daily program will so arranged as to allow the ladies to take the lectures in Entomology, Botany, Horticulture, Poultry, and other subjects of the short course in which they would naturally be interested in common with the men.

Work will begin at 8:15 o'clock a. m. and close at 3:40 p. m. During the course there will be no work on Monday, but this day will be spent in visiting places of interest such as the stock yards, stock farms, flour and flax mills, etc.

For the entire course, or any part thereof, a registration fee of \$5.00 will be charged.

Those taking this course should register and secure boarding places not later than Thursday, January 14th, as work will begin promptly at 8:15 on Friday, January 15th.

Board may be secured in either of the Twin Cities at \$3.50 to \$4.50 per week.

Farmers wishing to register for the course, or desiring further information, should write to D. D. Mayne, Principal, or Jas. M. Drew, Registrar, St. Anthony Park, Minn.

The course of lectures and study is outlined as follows:

Agriculture: The selection of farms and soils suitable for specific crop production; planning farms; developing the fields, drainage, roads, fences; developing the farmstead and its buildings; managing fields and growing, cultivating, harvesting and preserving forage and grain crops; the rotation of grain, cultivated and grass crops; the use of live stock; and general farm management.

Dairy stock judging: The instruction given in judging dairy stock will be based upon the actual performance of animals bred and reared in the dairy division, the records covering a period of five years and giving the annual yield of milk and butter fat, cost of production and profits.

Dairy husbandry: The lectures in dairy husbandry will cover the characteristics of the various breeds of dairy cattle, their comparative adaptability for the various phases of dairying and the style or type of cow that has demonstrated her ability as a large and economical producer. The scientific and practical phases of feeding for milk production will be explained and practical instruction and training given in calculating rations for milk production.

Animal husbandry: A series of lectures will be given on animal breeding. These lectures will include the known laws of breeding, such as heredity, variation and atavism. Attention will be given to such features as the selection of prepotent sires and dams, to cross breeding, in-breeding, and other matters of interest to the breeder of live stock. Pedigrees will be discussed and the students made familiar with the registration and transfer of pure bred stock. The feeding and management of horses, beef cattle, sheep and swine will also be discussed. Foods suitable to each class of animals, and methods of preparing and feeding them will be among the subjects receiving attention, together with directions for the practical management of stock while in the stable and pasture.

Soils: Lectures are given on the conservation of the fertility of the soil, the composition and use of farm and commercial manures, the draft of different farm crops upon the soil and the methods of making the fertility of the soil available by the rotation of crops and other means so as to secure the necessary changes in the soil to produce the highest degree of fertility. The judging of soils is made a feature of this work and includes the testing of soils and the determination of the type to which a soil belongs, the methods of cultivation and the crops most suitable to grow upon the soil.

Agricultural chemistry: The chemistry of plant growth and the chemical principles involved in farm life and their application to the production of crops forms the basis of this work.

Farm mechanics: The instruction given in this subject will consist of lectures on farm mechanics, taking up such subjects as pumps, farm water systems, windmills, the general principles of steam and gasoline engines, placing shafting, pulleys and belts, pipe fitting, soldering, etc. Some instruction will

The School of Agriculture

also be given in sharpening and using hand tools, such as saws, planes, chisels, and other tools necessary in farm practice.

Farm implements: The lectures on farm implements will be illustrated, as far as possible, by samples. Stereopticon views will be made use of in illustrating machines that cannot well be taken to the class room. It is the aim in these lectures to bring out the lines covering the draft of implements and the objects attained by their use. Suggestions will be made on selection of implements adapted to various kinds of work. The care of implements when not in use will also be discussed, and an attempt made to give as fully as possible all information that will be beneficial in the care and handling of farm machinery.

Dressing and curing meats: The work in dressing and curing meats will be given in a course of demonstration lectures. In demonstrating these lectures the animals will be dressed before the class and the reason for each operation fully explained. The methods of cutting up the dressed carcass for different purposes will also be shown before the class and the use and value of each cut explained. Sausage making, lard rendering, and the "working-up" of all parts of the animals will be taught in a simple and direct way.

Farm accounts: A series of lectures will be given on business forms, business arithmetic and the keeping of simple farm accounts and records.

Farm botany: Eight lectures will be given on the phases of botany of special interest to farmers; for example, the pollination of flowers, weeds and weed seeds, poisonous plants, fungus diseases of plants and how to deal with them.

Farm horticulture: Lectures will be given on the care and management of the apple and plum in this climate, including such subjects as location of the orchard, selection of the trees, planting, cultivation, green manuring; preparation for winter; advantages and disadvantages of root grafting, budding, and top working; diseases injurious to orchards. Lectures on the care and management of small fruits will consider the subjects of selection of varieties, planting and cultivation, origin of new varieties, propagation, marketing, winter protection, also the insects and diseases injurious to raspberries, blackberries, currants, gooseberries, strawberries and grapes. Under vegetable gardening will be considered the growing of potatoes, tomatoes, celery, onions, squash and cucumbers.

Veterinary science: This work includes a series of lectures on elementary anatomy, animal foods and digestion; and causes, prevention and treatment of common diseases of farm stock. An especial effort is made to have this work practical and helpful to men who are actually handling farm stock.

Poultry: Lectures will be given on this subject with special reference to the needs of the Minnesota farmer. The following subjects will be considered: Location and construction of poultry buildings and yards; a study of the breeds best adapted to the farmer's use; the hatching, rearing and management of the farmer's flock; feeding for eggs and for fattening; killing and dressing fowls, and packing for market; marketing eggs.

Economic entomology: The entomologist will give a course of lectures on injurious and beneficial insects, and will discuss the various insecticides and methods of application. The four-footed pests of the farm—rabbits, gophers, etc., are also studied, and a few lectures are given on practical bee-keeping. If there be sufficient demand to warrant, and time permits, a few lectures will be given on birds and their relation to agriculture.

Parliamentary practice: A debating club is made up of the members of the short course class and weekly meetings are held which give opportunity for learning how to conduct public meetings and for practice in public speaking.

Physics: This course consists of six lectures with illustrative experiments. In these exercises the following topics are discussed: The principles of draft in the horse; the causes of draft in wagons, including the effect of road-bed; the effect of grades or hills, involving the principle of the inclined plane; the various questions involved in eveners, road construction and maintenance; including the question of reducing grades, the power at which a horse works in to secure the necessary changes in the soil to produce the highest degree of plowing, hauling, etc.; horse power; farm drainage; weather forecasting.

Workshop hints: In addition to the above, four lecture periods will be devoted to farm workshop hints, such as splicing rope, making rope halters and rope belting, and tempering simple tools.

Short Course for Teachers

FACULTY

CYRUS NORTHROP, LL.D., *President.*
JOHN W. OLSEN, *State Superintendent of Public Instruction.*
E. W. RANDALL, *Dean.*
D. D. MAYNE, *Principal*
SAMUEL B. GREEN, B. S., *Horticulture, Forestry.*
HARRY SNYDER, B. S., *Agricultural Chemistry, Soils.*
T. L. HAECKER, *Dairy Husbandry, Animal Nutrition.*
M. H. REYNOLDS, M. D., V. M., *Veterinary Science.*
ANDREW BOSS, *Agriculture, Animal Husbandry.*
FREDERICK L. WASHBURN, M. A., *Entomology.*
E. M. FREEMAN, Ph. D., *Plant Pathology.*
WILLIAM BOSS, *Farm Mechanics.*
J. A. VYE, *Secretary and Treasurer, Accounts.*
J. M. DREW, *Registrar, Blacksmithing, Poultry.*
FANNIE C. BOUTELLE, *Domestic Economy.*
JUNIATA L. SHEPPERD, M. A., *Domestic Science.*
MARGARET BLAIR, *Domestic Art.*
JOHN A. HUMMEL, B. Agr., *Assistant in Agricultural Chemistry.*
COATES P. BULL, B. Agr., *Assistant in Agriculture.*
LEROY CADY, B. S., in Agr., *Assistant in Horticulture.*
D. A. GAUMNITZ, M. Agr., *Assistant in Animal Husbandry.*
A. D. WILSON, B. S. in Agr., *Assistant in Agriculture.*
A. G. RUGGLES, M. A., *Assistant in Entomology.*
E. C. PARKER, B. S. in Agr., *Assistant in Agriculture.*
S. B. DETWILER, B. S. in Agr., *Assistant in Forestry.*
A. D. WILHOIT, M. A., *Assistant in Soils.*
A. R. KOHLER, B. S. A., *Assistant in Vegetable Gardening.*

PURPOSE OF THE SCHOOL.

The short summer course for teachers, principals, and superintendents, is established to meet the demand for agricultural instruction by educators who wish to teach the elements of agriculture, or who wish to be able to supervise the teaching of the subject intelligently in the public schools. It is intended to be especially helpful to teachers who desire to be more efficient in teaching the elements of agriculture in rural schools, or in small village schools having an attendance largely from the country.

High school teachers who wish to get more complete information on agricultural subjects and technical work so as to make more practical

their teaching of botany, physics, chemistry and other natural sciences, may find here the opportunity they have long been seeking.

Principals of high schools who wish to introduce carpentry, blacksmithing, the elements of agriculture, sewing, cooking, may here get such an insight into the subjects that they may go about their introduction and supervision with some degree of confidence.

County superintendents having to do with country conditions more than others should seek to become familiar with modern agricultural problems and their solution. It is hoped that this short course may appeal to all the special classes mentioned as well as to some who are interested merely in the form of industrial education presented as a means of general information and culture.

LOCATION.

The school is located at the Experiment Station, midway between Minneapolis and St. Paul. It is about a 15-minute walk from the street car line. To reach the school from either city, take a Como-Harriet or Como-Hopkins car, and get off Commonwealth Avenue.

Although the school is located in the country, and has all the advantages of the quiet and fresh air of the country, yet it is close enough to the Twin Cities to get all the benefits of these large centers. No more beautiful spot between the two cities could have been selected for such a school. Situated on picturesque hills, overlooking the midway and the two cities, the buildings are grouped conveniently about the undulating campus. Nature has done much to make this a beauty spot and the landscape artist has added to the beauty in the arrangement of paths and the replacing of trees and shrubs with many varieties suited to the climate.

PLAN OF THE COURSE.

The course is planned for three weeks commencing Monday, June 8th and closing Saturday June 27th. This will give those having regular summer school work the opportunity to attend this course and then take with them to the summer schools the knowledge and inspiration obtained.

It is expected that those entering this course will take all the work outlined in the program. This is not a requirement but the program is so arranged as to make it possible. The work given in the several subjects will be made as practical as possible and will combine lecture work, laboratory work, and field exercises.

The dormitories and dining hall on the grounds will be open for the use of those attending the summer course. The close association of a body of educators for three weeks cannot but be helpful in many ways.

EXPENSE.

The registration fee for the entire course or for any part of it, is \$3.00. This small fee is made possible only by the generous donation of services by the heads of departments of the School of Agriculture and by the cooperation of State Superintendent J. W. Olsen.

Good board will be furnished at the large dining hall for \$3.50 per week. Dormitory rooms may be used free of charge. These rooms have all necessary furniture, except pillows, pillow cases, sheets, quilts and towels. Those expecting to occupy the dormitories should bring such articles with them. If desired, the articles named may be rented at the school for 60 cts. per week. It will aid greatly in making arrangements for the proper accommodations, if those who expect to attend will write of their intention before June 1st.

THE CONFERENCE HOUR.

A conference hour is arranged for each day before dinner. At this time subjects of special interest to school men and women will be considered. Round table discussions of pedagogical problems especially related to the introduction of vocational subjects into the public school curriculum will be held.

Short talks and lectures by State Superintendent Olsen, Dean James and other men prominent in educational work will be given. All subjects presented will be open for question and debate.

A number of evening lectures and entertainments will also be provided during the course.

During the course Dr. Reynolds will give two illustrated lectures on ventilation and animal diseases. Mr. Vye will also lecture on farm accounts and Mrs. Bouÿelle on domestic economics.

AGRICULTURE.

The lectures in Agriculture will cover the principles of soil formation and classification; soil water, its movements, and effect on plant growth; the relation of tillage to plant growth and the effect of tillage upon the mechanical condition of soils. Field crops, their cultivation, growth and care, will be presented from the standpoint of economic relation to farming. A series of discussions of the arrangement of crops and of farm plans will form a distinctive feature of this subject, thus giving the principles of soil preparation, crop growth and farm management.

all necessary furniture, except pillows, pillow cases sheets, quilts and

AGRICULTURAL CHEMISTRY.

The composition and comparative value of food materials, the changes which take place during their production, and the application of the principles of chemistry to plant and animal life form the basis of this work.

ANIMAL HUSBANDRY.

In animal husbandry, the work will consist of sketches of the history, development and classification of the various classes of live stock and their relation to farming; of comparisons of the types of each class and a study of the breeds of horses, cattle, sheep and swine. Good specimens will be used for illustrating the characteristics of each breed and for demonstrating the principle of selecting for specific purposes.

BLACKSMITHING.

A course of lessons in iron work will be offered to those who desire to prepare for teaching this subject in the common schools. This course will cover the essential principles of forging iron and steel and tempering the tools in common use.

DAIRY HUSBANDRY AND ANIMAL NUTRITION.

The lectures will cover the characteristics of the various breeds of dairy cattle, their adaptability for the various phases of dairying, and the style or type of cow that has demonstrated her ability as a large and economical producer. Instruction will be given in the scientific principles and practical phases of feeding, and training will be given in calculating and formulating rations.

DAIRY STOCK.

The instruction given in dairy stock will be based upon the actual performance of animals bred and reared in the dairy division; the records covering a period of five years, giving the annual yield of milk and butter fat and the cost of production and profits.

DOMESTIC ART.

This course will consist of lectures and exercises on models and plans for graded work in the public schools, including basting, the seam, the hem, the gusset, the placket, patching, darning, buttonholes and other hand sewing, also garment drafting, including the shirt waist, and making. Lectures will be given upon production and use of textiles, the judging of fabrics, the harmony of color and the beautifying of the useful in the school-room.

DOMESTIC SCIENCE.

This work will consist of lectures, class room demonstrations and of such library research as will enable students to make bibliography which will aid in securing reliable data for use in teaching this subject. The principles set forth in the lectures and discussions will be illustrated in either demonstration lectures or in individual practice, as the majority of the class may elect. The various methods of teaching this subject, now in general use, will be discussed and exemplified. In connection with this, a list showing utensils needed for a laboratory kitchen, with tentative cost will be compiled and considered. Results of experiments to ascertain the best means for introducing some work along domestic science lines into the rural schools will be studied.

ENTOMOLOGY.

Lectures will be given on the important features represented by this department. Such subjects as scale insects, plant lice, bee keeping, friendly insects, etc., will be dealt with in an effort to make the course as comprehensive as time permits and suited to the needs of teachers.

HORTICULTURE AND FORESTRY.

The course in horticulture and forestry will include lectures and laboratory periods, aimed to illustrate the fundamental principles underlying these subjects, and to show the best way in which they can be taught.

PLANT DISEASES.

Lectures will be given on important plant diseases of farm and garden crops, their economic importance, botanical features and methods of prevention and cure. Demonstrations and exhibitions of material will also be given.

POULTRY.

A course of lectures and demonstrations in the care and management of poultry will be given covering the subjects of poultry buildings the breeds of poultry, incubation, breeding, feeding and marketing. This course will be given at the season when the incubator and brooders will be in use thus affording a chance for practical work in this line to those who desire it.

SOILS.

Formation, physical properties, chemical composition and the judging, rating and scaling of soils are studied in the laboratory. Lectures are given upon the principles of soil fertility and the composition and uses

TENTATIVE PROGRAM.

Monday, June 8th, Registration.

	8:15	9:05	9:55	10:45	11:35	12:15	2:05	2:55	3:45
Tuesday, 9th	Agriculture	Fruit Gr.	Household Art Lec.	Ag. Hus. Cattle		Chem. Lec.	Chemical Laboratory		
Wednesday, 10th	"	"	"	"		Soils Lec.	Soils Lab.	Field Practicums	
Thursday 11th	"	"	"	"		Blacksmith Lec.	Blacksmith Shop Work		
Friday, 12th	"	"	Dom. Sc. Lec	"		Carp. Lec.	Carpentry Shop Work		
Saturday, 13th	"	"	"	Sheep		Dairy Lec.	Dairy Practicums		
Tuesday, 16th		Veg Gard	"	"		Chem. Lec	Chemical Laboratory		
Wednesday, 17th			Entomology	Swine		Soils Lec.	Soils Lab	Field Practicums	
Thursday 18th		"	"	"		Blacksmith Lec.	Blacksmithing Shop Work		
Friday, 19th		"	"	Poultry		Carp. Lec	Carpentry Shop Work		
Saturday, 20th		"	"	"		Dairy Lec.	Dairy Practicums		
Tuesday, 23rd.		Forestry	Plant Diseases	Horses		Chem. Lec.	Chemical Laboratory		
Wednesday 24th		"	"	"		Soils Lec.	Soils Lab.	Field Practicums	
Thursday, 25th		"	"	"		Blacksmith Lec	Blacksmithing Shop Work		
Friday, 26th	"	"	"	"		Carp. Lec.	Carpentry Shop Work		
Saturday, 27th	"	"	"	"		Dairy Lec.	Dairy Practicums		

The School of Agriculture

COPY OF LETTER FROM STATE SUPERINTENDENT OLSEN

State of Minnesota,

DEPARTMENT OF PUBLIC INSTRUCTION,

St. Paul, January 24, 1908.*To Superintendents and Teachers of Minnesota:*

The child needs that fundamental education that will aid him to find his individual place in life and teach him how to get the best out of living. He needs the special education that will thoroughly equip him for earning a livelihood when his school days are over.

In all our schools the tendency has been to make education too bookish. The country school has trained away from rather than toward the life of the farm. Of recent years practical science has been moving forward by leaps and bounds, but the knowledge acquired by it on its march has not reached the rural school to an extent adequate to the situation. Now, within the reach of every farmer's child there ought to be a school giving as good instruction and as much instruction in the general branches as is given by the city school, "but, instead of being colored with the activities of the city, it should have the equally useful and more delicious flavor of the soil."

County superintendents and others realize the imperative need for teachers who can with intelligence and real sympathy relate the instruction of the school to the natural interests and experience that environ the country boy and girl.

Through the generous enthusiasm of Dean Randall of the state college of agriculture and his staff, nearly all of whom offer their services free, it has been made possible to afford educators the opportunities outlined in this bulletin. While the primary object of the courses is to meet the present day needs of the rural schools, they are so suggestive and so comprehensive that they cannot but prove invaluable to the city teachers, principals and superintendents.

It is to be hoped that county superintendents, conductors and instructors of summer training schools and teachers generally will still further fit themselves for service at this unique training school. More delightful surroundings for a summer school than University Farm it would be hard to imagine. The situation of the school, midway between the business portions of St. Paul and Minneapolis, makes it readily accessible from either city, and no college in the country is better equipped as to modern conveniences and facilities for extensive observation and study.

Upon recommendation of the faculty those perfect in attendance will receive a credit in agriculture toward a first grade state certificate that will exempt them from examination in plane geometry or in physical geography as they prefer.

Please take notice that the instruction is not to be given by tutors or assistants, but almost wholly by the professors of the school, men and women of national reputation, whose service we can recompense only by accepting what they so generously contribute—knowledge that we may apply to good purpose, inspiration by which we may inspire others.

(Signed) J. W. OLSEN,
Superintendent.

The Agriculture Experiment Station

STATION OFFICERS.

J. A. VYE, *Secretary.*

EXPERIMENT CORPS.

E. W. RANDALL, *Director.*

SAMUEL B. GREEN, B. S., *Horticulturist.*

HARRY SNYDER, B. S., *Agricultural Chemistry and Soils.*

T. L. HAECKER, *Dairy Husbandry and Animal Nutrition.*

M. H. REYNOLDS, M. D., V. M., *Veterinarian.*

ANDREW BOSS, *Agriculturist and Animal Husbandry*

FREDERICK L. WASHBURN, M. A., *Entomologist.*

J. A. HUMMEL, B. Agr., *Assistant Chemist.*

COATES P. BULL., B. Agr., *Assistant in Agriculture.*

A. G. RUGGLES, M. A., *Assistant Entomologist.*

A. J. MCGUIRE, B. Agr., *Superintendent, Grand Rapids.*

D. A. GAUMNITZ, M. Agr., *Assistant in Animal Husbandry.*

A. D. WILSON, B. S. in Agr., *Assistant in Agriculture.*

E. C. PARKER, B. S. in Agr., *Assistant in Agriculture.*

WM. ROBERTSON, B. S., *Superintendent, Crookston.*

C. C. LIPP, D. V. M., *Assistant in Veterinary Science.*

A. D. WILHOIT, M. A., *Assistant in Soils.*

The bulletins of this Station are mailed free to all residents of this state who make application for them.

The Agricultural Experiment Station of the University of Minnesota was established by National and State legislation in 1887. The function of the Experiment Station as set forth in the Hatch Act is "to aid in acquiring and diffusing among the people useful and practical information on the subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science." The funds provided by the National Government have been supplemented recently by the Adams Act which will ultimately provide \$15,000 annually, and appropriations for special lines of experimental work have also been made by the State Legislature.

The Experiment Station is located at University Farm, St. Anthony Park, and is one of the Divisions of the Department of Agriculture of the University of Minnesota, and the officers of the station are also profes-

sors and instructors in the School and College of Agriculture. The chief executive officer of the station is the Director who is also Dean of the College of Agriculture. Affiliated with the main station are a score or more of trial stations maintained by the State Horticultural Society. The Experiment Station also carries on co-operative tests and investigations with the U. S. Department of Agriculture and with farmers in various parts of the State. The Station has published since its organization in 1887, one hundred five regular, twenty-nine press and fifteen class bulletins.

The principal lines of work conducted at the station are as follows: Chemistry of soils and farm crops; field experiments—rotations, tests of varieties of cereals and forage crops, time and depth of seeding grains and amount of seed, methods of seeding grasses; horticultural—tests of varieties of fruits and vegetables, use of wind-breaks, testing hardy stocks for apple trees, improvement of native fruits; forestry; diseases of plants; food and nutrition of man; plant and animal breeding; feeding experiments; diseases of animals; entomology; dairying; farm management and farm statistics.

NORTHWEST EXPERIMENT FARM.

To give special consideration to local conditions in the northwestern part of the state an experiment farm was established at Crookston in 1895. The farm contains 450 acres and is one mile north of the city. It has a well-equipped poultry plant from which much good breeding stock is being distributed among the farmers. With aid from the U. S. Office of Experiment Stations the farm is taking an active part in testing surface and tile drainage for the Red River Valley region. It is also encouraging a more extensive growing of clover. The Crookston School of Agriculture is operated in connection with the farm. (See page 25.)

EXPERIMENT FARM AT GRAND RAPIDS.

The legislature of 1895 also provided for a second experiment farm to make possible a more thorough study of the agricultural conditions of the northeastern portions of the state. This farm was located at Grand Rapids April 16, 1896, and lies two miles east of the village. It contains approximately 375 acres of land, with the necessary farm equipment consisting of dwelling house, barns, machinery, live stock, etc.

Bulletins of the Experiment Station for 1907

GENERAL BULLETINS:

No. 101 Forage Crops of High, Medium and Low Protein Content.

No. 102. Soil Investigations.

1. Fertilizer Tests with Wheat and Corn.

2. Influence of Fertilizers upon the Composition and Quality of Wheat.

3. Comparison of Chemical Methods and Field Tests for Determining the Fertilizer Requirements of Soils.

No. 103 Dissemination of Tuberculosis by the Manure of Infected Cattle.

No. 104 Pork Production.

1. Hogging-off Corn vs. Yard Feeding.

2. Field Management of Swine.

3. Observations.

No. 105 Importance of the Study of Entomology; Directions for Collecting and Studying Insects.

PRESS BULLETINS:

No. 27 A Hint to Flax Growers.

No. 28 The Fall Web Worm a Menace in Minnesota.

Autumn Remedies for the Stalk Borer in Flower Gardens.

No. 29 Seed Corn Shortage.

THE COLLEGE of LAW

The College of Law

FACULTY

CYRUS NORTHROP, LL.D., *President.*

WILLIAM S. PATTEE, LL.D., *Dean and Professor of Law*

A. C. HICKMAN, LL.D., *Professor of Law*

HENRY J. FLETCHER, LL.M., *Professor of Law*

EDWIN A. JAGGARD, LL.D., *Associate Justice of the Supreme Court*

HOWARD S. ABBOTT, B.L., *of the Hennepin County Bar*

ROBERT S. KOLLINER, LL.B., *of the Hennepin County Bar*

HUGH E. WILLIS, A.M., LL.M., *Assistant Professor*

HUGH V. MERCER, LL.M., *Minneapolis*

HOMER W. STEVENS, A.M., LL.M., *Librarian*

LECTURERS.

CHARLES W. BUNN, St. Paul.

Federal Jurisdiction.

CHRISTOPHER D. O'BRIEN, St. Paul.

Criminal Procedure.

JARED HOW, LL.B., St. Paul.

Landlord and Tenant.

SPECIAL LECTURERS FOR 1907-8.

HON. JOHN LIND, Minneapolis; Ex-governor of Minnesota.

Law of Interstate Commerce.

CHARLES B. ELLIOTT, Minneapolis; Justice Supreme Court of Minn.

Disputed Questions in International Law.

A. B. JACKSON, LL.B., Minneapolis.

Conflict of Laws.

T. D. O'BRIEN, St. Paul; Ex-insurance Commissioner.

Proper exercise of the Police Power of the State.

JOHN W. WILLIS, A.B., St. Paul; Ex-judge of District Court.

Lawyers, Oriental, Medieval and Modern.

WM. A. LANCASTER, Minneapolis; Ex-judge District Court of Minn.

Impairing Obligation of Contracts.

JOHN F. MCGEE, Minneapolis; Ex-judge District Court, Minn.

Federal Jurisdiction.

ROME G. BROWN, LL.B., Minneapolis.

Water-rights.

HON. DANIEL FISH, Minneapolis.

Law Making.

HON. EDMUND S. DURMENT, St. Paul.

Eminent Domain.

The College of Law

OBJECT

It is the object of the College of Law of the University of Minnesota to educate its students by means of the study of jurisprudence, and at the same time so familiarize them with the fundamental principles of positive law that they will be able, at the end of their course, to safely enter upon the duties of the legal profession. Education, and not simply information, is the prime object. The power to think clearly, to reason cogently, to perceive distinctions quickly, to investigate thoroughly, to generalize carefully and to express his thoughts accurately are the basal qualifications of the safe counsellor. To secure for the students these habits of thought and expression should be the aim of both the student himself and his instructor.

The method of work generally pursued in the college is threefold. *First.* The reported cases being the original repositories of the principles of law and equity, are read by the student and considered in the class-room. To facilitate the work and save expense for the student, volumes of these cases are reprinted and put, free of charge, into the hands of the student during the continuance of the subject, and each subject is pursued daily until its completion. *Second.* Besides reading the cases, the student in most subjects is required to prepare a written analysis of each case, stating in his own words, the issue upon which the case turns, the law which governs it, a brief statement of the facts, and the conclusion which the law and facts logically necessitate. This practice has proved helpful in securing a greater thoroughness in reading, greater carefulness in reasoning and greater accuracy on the part of the student in the art of expression. *Third.* In addition to the student's investigation of the cases, and his presentation of them to his instructor, a systematic and orderly arrangement of each subject in the form of a summary, and much additional information regarding the details of the law's application in particular instances and a consideration of the exceptions, limitations and statutory modifications of general principles, and especially information regarding the art of practice, are indispensable, and are in most instances supplied by printed lectures prepared for that purpose, or by well-written textbooks upon the subject under consideration. *Information, as well as education,* is necessary to prepare a student to begin the practice of law

So far as possible he should, at the end of his course, grasp the various subjects of law in the unity of a system, and to do this he must, in many instances, take the generalizations of his instructor, or take them from some text-book, until he shall find time to investigate the subject for himself.

LAW BUILDING

The Law building, recently enlarged, is admirably adapted to the uses for which it was constructed. It supplies ample facilities for all the varied exercises of the college. The entire upper story is devoted to the library and reading room, except that portion of it conveniently arranged for the Judge's Chambers, the Court room, the Clerk's office, the Jury room, and the offices of the Dean. Upon the first floor there is a large and convenient auditorium, lecture rooms, and private offices for the professors, besides the general office for the special business of the department. Under the most recently constructed portion of the building there is a well-lighted and convenient basement, devoted to society rooms for the legal, literary, and debating organizations. As now reconstructed and arranged the building provides for all the conveniences of a modern courthouse for the practice department, furnishes ample light and well-ventilated reading rooms and other excellent library facilities, and affords sufficient room for all the other regular work of the College.

REQUIREMENTS FOR ADMISSION

Graduates of universities or colleges, and students who have graduated from any normal school or State high school of Minnesota, or from similar institutions of equal grade in other states, may be admitted without examination upon presentation of their diplomas.

All other applicants must pass an examination in the studies required for admission to the freshman class of the College of Science, Literature and the Arts, which are as follows:

N. B.—Time element, as indicated with each subject, is essential.

English, Four years, including

(a) Classics.

(b) Principles of composition.

(c) Practice in written expression.

Algebra, elementary, one year.

Geometry, plane, one year.

In addition to the above named subjects, which are required for all courses, and for which substitutes cannot be accepted, applicants shall present evidence of preparation in *nine* year-credits, or their equivalent, to be chosen from the following list:

Algebra, higher, one half year

Geometry, solid, one half year

Latin,

Grammar, (one year credit)

Caesar, four books, (one year credit)

Cicero, six orations, (one year credit)

Vergil, six books, (one year credit)

Greek,

Grammar, (one year credit)

Anabasis, four books, (one year credit)

German,

Grammar, (one year credit)

Literature, (one year credit)

French,

Grammar, (one year credit)

Literature, (one year credit)

Spanish, (two years)

Grammar, one year

Literature, one year

History,

Ancient, to Charlemagne, one year

Modern, from Charlemagne, one year

England, one half year

Senior American, one half year

Civics, (one-half year credit)

Political economy, (one-half year credit)

Physics, (one year credit)

Chemistry, (one year credit)

Botany, (one-half or one year credit)

Zoology, (one-half or one year credit)

Astronomy, (one-half year credit)

Commercial Geography, (one-half or one year credit)

Geology, (one-half year credit)

Physiography, (one-half year credit)

N. B.—By a *year credit* is meant a full year's work upon one subject, the recitations per week, as given in an ordinary high school course.

Substantial equivalents may be substituted, and a business education, well as experience in teaching, may be accepted in lieu of some of the less important subjects.

Applicants who have diplomas entitling them to admission without examination should present them to the dean of the college, and those who are to take examinations or enter as special students, should present

themselves to the dean, who will, upon proof of their qualification for admission, refer them to the registrar and accountant to whom they pay **their** matriculation fee and the first term's tuition.

SPECIAL STUDENTS

Persons who are not candidates for a degree may enter the College as special students by special permission of the faculty; but any undergraduate from a high school will be required before admission to present to the faculty a satisfactory record of his high school work and an honorable discharge from such high school. And all such students will be entitled to a certificate upon satisfactory examination in the subjects pursued by them, stating the time they have been members of the college and the subjects in which they have passed a creditable examination.

Such students, however, if they elect studies in both the day and evening courses, pursuing both at the same time, will be charged ten dollars per term additional tuition.

Students in the day or evening classes will not be permitted to attend more than two courses of lectures daily, unless in exceptional cases, and then a card of admission must be procured from the faculty and ten dollars per term additional tuition must be paid.

Students who are regular members of one class, either day or evening, will not be permitted to pursue studies in any class in advance of that to which they belong, unless there are special circumstances requiring it, and only upon special permission granted by the faculty.

SENIOR ELECTIVES

Students in the senior class of the College of Science, Literature, and the Arts, are permitted to elect, throughout the senior year, work in the College of Law, including the elements of contracts, domestic relations, torts, criminal law and negotiable paper. The satisfactory completion of the above named subjects will give the student a six hour credit throughout the senior year, and will entitle him to admission to the middle class of the College of Law. No such student will be permitted to take more than one lecture per day in the College of Law, without special permission of the faculty of the College of Science, Literature and the Arts.

ADVANCED STANDING

Should any person desire to enter the middle or senior class for a degree he must be at least nineteen years of age, must pass the required preliminary examination upon the subjects of the preceding year or years, or their equivalents, but no person will be allowed to receive his degree

who has not spent one full year in this department. Attorneys at law, however, who have been admitted to practice in the state of Minnesota and have a high school education or its equivalent, may enter the senior class without examination upon presentation of their certificates of admission, and shall be entitled to their degree upon a satisfactory showing at the final examination of the year upon the entire work of the three years.

ENTRANCE REQUIREMENT BEGINNING SEPTEMBER, 1909.

In addition to the preceding requirements for entrance as a regular student, there will be required, beginning September, 1909, one year of academic work, in the University of Minnesota, or in some other university or college of equal rank. This advanced work will be required of all students who wish to obtain the degree of Bachelor of Laws—whether they matriculate for the day or the evening work—but students with a high school diploma, will be admitted to the college without examination, as at the present time, receiving at the close of their course of study, a certificate indicating the subjects they have taken, and the character of their work.

And students who have not completed a high school course of study may enter the college upon satisfactory evidence that they are capable of doing the work in a satisfactory manner, and with profit to themselves, and they shall also receive a certificate showing the subjects they have taken, and the character of the work they have done.

ELECTIVES IN OTHER DEPARTMENTS

Students in the College of Law, may be permitted, after the junior year and under proper regulations, to elect work in other departments of the University, without extra charge, so far as it does not interfere with their work in Jurisprudence. The faculty of law encourage students to avail themselves of this opportunity during the middle and senior years, but such election of work should be made only after consultation with the faculty. Among the subjects which may be profitably selected are English and American Constitutional History, political science, and economics. Students who elect such work must complete it in a satisfactory manner before the degree in law will be conferred upon them.

TRANSFER OF STUDENTS

Students who matriculate in the College of Science, Literature and the Arts, or in other departments of the University, and fail in their work in such college, will not be admitted to the College of Law until such unfinished work shall have been satisfactorily completed.

The faculty earnestly advises all young men contemplating a course in law, and especially those who expect to engage in practice, to take the first two years at least, in the College of Science, Literature and the Arts, and if possible to complete the entire course there, before entering the College of Law.

DAY COURSE OF THREE YEARS

FIRST YEAR—JUNIOR

Contracts (twelve weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Personal Property and Sales (eight weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Domestic Relations (four weeks)	PROFESSOR PAIGE
Illustrative cases.	
Common Law Pleading (three weeks)	PROFESSOR HICKMAN
Text Books, Phillips.	
Torts (nine weeks)	PROFESSOR PAIGE
Illustrative cases.	
Equity (Maxims) (six weeks)	DEAN PATEE
Illustrative cases.	
Commercial Paper (four weeks)	PROFESSOR PAIGE
Illustrative cases.	
Blackstone (Second Book) (four weeks)	PROFESSOR PAIGE
Lewis' or Cooley's Blackstone.	
Agency (three weeks)	PROFESSOR PAIGE
Illustrative cases.	
Criminal Law (five weeks)	PROFESSOR PAIGE
Illustrative cases.	

SECOND YEAR—MIDDLE

Wills and Administration (four weeks)	PROFESSOR PAIGE
Illustrative cases.	
Chattel Mortgages (three weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Partnership (four weeks)	PROFESSOR PAIGE
Illustrative cases.	
Code Pleading (seven weeks)	PROFESSOR HICKMAN
Phillips on Code Pleading and Illustrative Cases.	
Liens (two weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Bankruptcy (two weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Bailments and Carriers (four weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Private Corporations (five weeks)	ROBERT S. KOLLINER
Illustrative cases.	
Public Corporations (three weeks)	HOWARD S. ABBOTT
Illustrative cases.	
Insurance (three weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Equity (Doctrines) (six weeks)	DEAN PATTEE
Illustrative cases.	
Damages (four weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Real Property (twelve weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Landlord and Tenant (two weeks)	JARED HOW
Illustrative cases.	

THIRD YEAR—SENIOR

Evidence (five weeks)	PROFESSOR HICKMAN
Greenleaf on Evidence (Vpl. I) and Illustrative cases.	

Trusts (three weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Minnesota Real Property (four weeks)	PROFESSOR PAGE
Illustrative cases.	
Constitutional Law (six weeks)	PROFESSOR FLETCHER
Illustrative cases.	
International Law (four weeks)	PROFESSOR FLETCHER
Illustrative cases and text-book.	
Taxation (four weeks)	JUSTICE E. A. JAGGARD
Professor's text-book and illustrative cases.	
Equity (Remedies) (six weeks)	DEAN PATTEE
Illustrative cases.	
Mortgages (four weeks)	DEAN PATTEE
Illustrative cases.	
College Court. Each student is required to have two cases in court of Justice of the Peace.	
Four cases in District Court.	A. C. HICKMAN, Judge
One Case in Supreme Court	W. S. PATTEE, C. M. FERGUSON, H. E. WILLIS, Justices

FOUR YEAR EVENING COURSE

To accommodate those who cannot attend the school during the day there is offered an evening course, comprising the same subjects as those above enumerated, extending over a period of four years, of nine months each. But if any student in this course will, during the first three years, complete the work of the fourth year, in the day class, he may be allowed to graduate at the end of the third year.

FIRST YEAR

Contracts (eleven weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Domestic Relations (four weeks)	PROFESSOR PAGE
Illustrative cases.	
Personal Property and Sales (seven weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Torts (nine weeks)	ROBERT KOLLNER
Illustrative cases.	
Criminal Law (five weeks)	PROFESSOR PAGE
Illustrative cases.	

SECOND YEAR

Wills and Administration (four weeks)	PROFESSOR PAGE
Illustrative cases.	
Partnership (four weeks)	PROFESSOR PAGE
Illustrative cases.	
Equity (Jurisdiction and Maxims) (four weeks)	DEAN PATTEE
Illustrative cases.	
Bailments and Carriers (three weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Private Corporations (six weeks)	ROBERT S. KOLLNER
Illustrative cases.	
Public Corporations (three weeks)	HOWARD S. ABBO
Illustrative cases.	
Commercial Paper (four weeks)	PROFESSOR PAGE
Illustrative cases.	
Blackstone (three weeks)	PROFESSOR PAGE
Lewis' or Cooley's Blackstone.	
Insurance (three weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Common Law Pleading (two weeks)	PROFESSOR HICKMAN
Text-book, Phillips.	

THIRD YEAR

Evidence (five weeks)	PROFESSOR HICKMAN
Greenleaf on Evidence (First Vol.) and illustrative cases.	

Code Pleading (seven weeks)	PROFESSOR HICKMAN
Phillips on Code Pleading and illustrative cases.	
Constitutional Law (five weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Equity (Doctrines and Remedies) (seven weeks)	DEAN PATTEE
Illustrative cases.	
Chattel Mortgages (two weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Real Property (ten weeks)	PROFESSOR FLETCHER
Illustrative cases.	

FOURTH YEAR

Liens (two weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Real Estate Mortgages (three weeks)	DEAN PATTEE
Illustrative cases.	
Minnesota Real Property (four weeks)	PROFESSOR PAIGE
Illustrative cases.	
Agency (three weeks)	PROFESSOR PAIGE
Illustrative cases.	
International Law (three weeks)	PROFESSOR FLETCHER
Text-book and illustrative cases.	
Trusts (three weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Damages (four weeks)	ASSISTANT PROFESSOR WILLIS
Illustrative cases.	
Taxation (three weeks)	JUSTICE E. A. JAGGARD
Professor's text-book and illustrative cases.	

College Court Work, throughout the year.

Special lectures during the year upon the subjects of Abstracts, Practice in the United States Courts, Conflict of Laws, Federal Jurisdiction, Bankruptcy, Criminal Procedure, and Landlord and Tenant.

THIRD YEAR COURSE FOR 1908-1909

Evidence (five weeks)	PROFESSOR HICKMAN
Greenleaf on Evidence and illustrative cases.	
Blackstone (four weeks)	PROFESSOR PAIGE
Lewis' or Cooley's Blackstone.	
Code Pleading (seven weeks)	PROFESSOR HICKMAN
Phillips on Code Pleading and illustrative cases.	
Real Property (eight weeks)	PROFESSOR FLETCHER
Illustrative cases.	
Minnesota Real Property (three weeks)	PROFESSOR PAIGE
Illustrative cases.	
Equity (eight weeks)	DEAN PATTEE
Illustrative cases.	
College Court Work throughout the year.	

SPECIAL COURSE

For the benefit of those who do not care to pursue an extended course of legal instruction, but desire such a knowledge of law as will be of value to them in a business career, the foregoing regular courses are arranged so that, upon consultation with the faculty and registration as special students, such men may pursue certain special courses, embracing the following: Contracts, including statute of frauds; agency; commercial paper; partnership; bankruptcy law; liens; bailments; master and servant; insurance; sales; and such other subjects as their business life or preference may render desirable.

GRADUATE COURSE

FIRST

For the benefit of those students who wish to pursue their legal studies further than they are able to do in the undergraduate years, two graduate courses are offered, the first leading to the degree of master of laws, (LL.M.), the second to the degree of doctor of civil law, (D.C.L.).

The courses of lectures offered in the first year of graduate work are as follows:

Philosophic basis of jurisprudence.

Roman law.

Political science.

Constitutional jurisprudence and history.

Those who enter this course as candidates for the degree must have already received the degree of bachelor of laws, from this or some other law college having a three-year course of study. Those who spend the entire year in the work prescribed for this course, and pass a satisfactory examination upon the subjects taken, will be entitled to the degree of master of laws.

But the diploma conferring this degree of LL.M. does not entitle its holder to admission to the bar.

SECOND

Students who have received the degree of LL.B., from this or some other law school requiring three years' study of law for said degree, and who have also received the degree of LL.M., from this or some other school, after not less than one year of graduate study, and who have taken high rank in all the studies leading to these degrees, may apply to the faculty for the degree of Doctor of Civil Law. A knowledge of French or German, as well as of Latin is required, and special proficiency in Roman history is necessary to entitle a student to entrance for such degree.

There is no prescribed time within which students are required to do their work in this course, but they must make themselves proficient in the subjects of Roman law, political science, comparative constitutional law, and the philosophy of jurisprudence before any thesis will be accepted from them.

None of the aforementioned degrees will be conferred until a satisfactory thesis is presented to the faculty by the student, and the thesis

the doctor's degree must be one evincing original investigation and special excellence.

Whether a class will be organized in this course during the academic year of 1908 and 1909 will depend upon the number of applicants for admission.

TUITION

UNDERGRADUATE STUDENTS

A matriculation fee of ten dollars must be paid by every student entering the college. The tuition fee is sixty dollars a year or twenty dollars per term payable in advance at the beginning of each term.

GRADUATE STUDENTS

The tuition fee for graduate students is forty dollars per year, payable in advance as follows: twenty dollars at the beginning of the school year, and twenty dollars February 1st following. In addition a matriculation fee of ten dollars is due from each student entering upon the course who has not previously matriculated in this college.

FREE CASE BOOKS

In order to protect the College, Bar Association and State Libraries from the special injury incident to continual use, and to facilitate the class work of the college, free case books are furnished the students by the University.

LIBRARIES

The college has a good library containing those English and American reports most frequently cited, digests, dictionaries, and a full and excellent selection of standard text-books. To this collection additions are being constantly made.

Further facilities are afforded the college by the generous action of the Bar Association of Minneapolis in granting to the students the free use of its extensive and ample library located in the Court House. It contains all the American reports, state and national, and also the English text-books and reports, so necessary for the student in his study of fundamental jurisprudence.

Besides the University and Bar Association libraries, the State library, containing all books which a student would have occasion to

consult, is located at the capitol, in St. Paul, and is thus within easy reach of the students.

The general library at the University contains about seventy-five thousand bound volumes, besides many thousand volumes of pamphlets, magazines, reports, etc. About one hundred and twenty periodicals are received regularly by the library, not inclusive of technical magazines and newspapers in English and other languages.

Besides the general library of the University, there are several special libraries, consisting mainly of books of reference and current periodicals relating to technical subjects in connection with the several departments of engineering, biology, and botany. These libraries are open during the entire day, and the University library is open also in the evening.

METHODS OF INSTRUCTION

The recitations of the Junior and Middle day classes occupy the forenoon, and the Senior day class the afternoon, and the evening classes begin their work at seven-thirty P. M. Each subject is continued daily until its completion, one recitation following another immediately in order to save the student the expense and time required in going to and returning from the University.

Each recitation period continues sixty to ninety minutes, and the work of the class room continues six days each week, except that the Senior day and the night classes do not meet on Saturdays.

EXAMINATIONS FOR PROMOTION

Examinations will be held at the close of each subject during the middle and junior years, and no student who fails to pass a satisfactory examination in any of his studies will be advanced to the next higher class, except upon special permission of the faculty; and no such permission will be granted to any student who has failed in more than two subjects; but if he has not failed in more than two subjects he may be admitted to the next higher class provided he makes up those studies in which he is deficient by taking them in the regular classes where they are taught.

At the end of the middle year an examination is held upon the work of both the Junior and Middle years, for such students as the Faculty may select because of their low grades, or because their work, in whole or in part, was taken in another school, and if any student fails

to pass this examination satisfactorily to the faculty he will be denied admission to the Senior class.

EXAMINATION FOR GRADUATION

While the grades secured by students upon examination at the end of each subject will, as a general rule, stand as a final grade, yet, if a student has taken any part of his work in an office or in another law school, or for any other reason the faculty consider a review of any student's work desirable, he shall take such examination upon such subjects as the faculty may select, and only upon passing such examination satisfactorily to the faculty, shall he be entitled to his diploma.

COLLEGE COURTS

As fast as the student becomes acquainted with the primary rights of persons, cases are prepared for his consideration, whereby he may apply the principles of law with which he has become familiar.

There is also established in the senior year a system of college courts corresponding to the justice, the district and the supreme courts of Minnesota, wherein the student may become familiar with the practice and the rules of the courts respectively.

It is the aim of the department to acquaint the student with the practice as well as the theory of law, and to this end the subjects of pleading, evidence, rules of practice adopted by our state courts, methods of securing provisional remedies, appeals from one court to another, the writs of habeas corpus, certiorari, and others of frequent use, conveying, drawing contracts and other like practices which comprise the daily work of the general practitioner, will, during the senior year, receive special and careful attention.

Some member of the faculty will preside over each of these courts, and the student is required to prepare appeal papers, bonds, paper books and to furnish the courts with his points and authorities according to requirements of law applicable to the various courts of the state.

STATE AND UNITED STATES COURTS

The department is located within easy reach of both the federal and state courts. The United States courts are in session in St. Paul and Minneapolis during the greater part of the school year. The supreme court of Minnesota, the district courts of Ramsey and Hennepin counties,

and the municipal courts of St. Paul and Minneapolis are open and in session almost constantly, and afford all the opportunity for witnessing the trial of actual cases which the student will have either time or desire to improve.

THE LITERARY SOCIETIES

The students of the college have organized three literary societies for the purpose of general improvement and for cultivation in the practice of extemporaneous speaking. They hold weekly meetings and derive great benefit from their exercises.

PRIZES

THE PILLSBURY PRIZE

Three prizes of \$100, \$50, and \$25, offered by the heirs of the Hon. John S. Pillsbury, are awarded for the best work in the rhetoric department, as evidenced finally by an oration in public.

THE DUNWOODY PRIZE

Mr. Wm. H. Dunwoody, president of the St. Anthony and Dakota Elevator Co., offers \$100 to that student who shall earn the right to represent Minnesota in the Northern Oratorical League. This league is composed of the seven largest universities of the central states, viz: Minnesota, Iowa, Wisconsin and Michigan State Universities, and Oberlin, Chicago and Northwestern.

THE LOWDEN PRIZE

Mr. Frank O. Lowden, of Chicago, offers a prize to be competed for by the Northern Oratorical League, an endowment of \$3,000, which will yield an annual income of about \$175. A prize of \$100 will be given to the winner of the first place, \$50 to the orator who gets second place, and the remainder will be set aside each year for an interest fund to accumulate, and, in time, produce another endowment.

DEGREE OF BACHELOR OF LAWS

The degree of bachelor of laws will be conferred upon regular students of good moral character who pursue the full course in this college and pass an approved examination, and the degree will also be conferred

upon those who, having attended another law school for the period of two years, shall also attend one year in this college and pass a like examination upon the three year's work. Students who pass their examinations with distinguished excellence will receive the degree of Bachelor of Laws, *cum laude*.

EXPENSES

These depend largely upon the tastes and habits of the individual. Students find no difficulty in obtaining board among the people of the city. Good board can be obtained for \$4.00 per week. Students board in clubs at less expense.

For further particulars write to the Dean, W. S. Pattee, and all the information necessary for the student will be furnished promptly. The Dean will be pleased to correspond with any one who is thinking of pursuing a course of legal study. Letters addressed to him at Minneapolis, Minnesota, will receive prompt attention.

ADMISSION TO THE BAR

Students residing in Minnesota are admitted to the bar of this state upon presenting to the court their diploma, conferring the degree of LL.B., without examination or other condition, except that each applicant for admission must furnish a certificate of good moral character, and make affidavit of residence and citizenship in Minnesota.

DEPARTMENT of MEDICINE

THE COLLEGE OF MEDICINE AND SURGERY

The Department of Medicine

The Department of Medicine includes the following colleges:

The College of Medicine and Surgery

FRANK F. WESBROOK, M.A., M.D., C.M., *Dean.*

THOMAS G. LEE, B.S., M.D., *Secretary and Librarian, Department of Medicine*

The College of Homeopathic Medicine and Surgery

EUGENE L. MANN, B.S., M.D., *Dean.*

The College of Dentistry

ALFRED OWRE, D.M.D., M.D., *Dean.*

The College of Pharmacy

FREDERICK J. WULLING, Phm.D., LL.M., *Dean.*

Each College is self-governed as to its internal affairs, having its own faculty and an independent curriculum. The laboratories and staff of the College of Medicine and Surgery provide instruction for all students in each of the four colleges, as required, in the following branches:

Gross and microscopic anatomy, histology, embryology, neurology, physiology, chemistry, physiological chemistry, pathology and bacteriology, pharmacology, principles of surgery and clinical microscopy.

For the betterment of medical education in Minnesota, it was deemed advisable, after consultation, that the College of Physicians and Surgeons of the Medical Department of Hamline University should merge with the College of Medicine and Surgery of the University of Minnesota. The final formalities were completed at a special meeting of the Board of Regents of the University of Minnesota, held March 4, 1908.

Arrangements have been perfected whereby the members of the present freshman, sophomore and junior classes of the Medical Department of Hamline University will receive their instruction in the University of Minnesota, being required to comply with the rules and regulations which govern the College of Medicine and Surgery of the University of Minnesota. At the end of each year, certificates will be issued by the State University authorities to President Geo. H. Bridgman, Vice-President J. T. Moore, M. D., and Dean C. A. McCollom, M. D., as representing the trustees of the College of Physicians and Surgeons, Medical Department, Hamline University. This arrangement is continued for the next four years only, for the purpose of enabling the students now enrolled in Hamline Medical Department, who satisfactorily complete the requirements for the degree in medicine, to receive the usual degrees from Hamline University.

The College of Medicine and Surgery

FACULTY

CYRUS NORTHROP, LL.D., *President*

CHARLES A. WHEATON, M.D., *Emeritus Professor of Surgery*

J. W. BELL, M.D., *Emeritus Professor of Medicine and Physical Diagnosis*

FRANK F. WESBROOK, M.A., M.D., C.M., *Dean and Professor of Pathology and Bacteriology*

AMOS W. ABBOTT, M.D., *Clinical Professor of Diseases of Women*

EVERTON J. ABBOTT, A.B., M.D., *Clinical Professor of Medicine and Chief of Medical Clinic*

RICHARD O. BEARD, M.D., *Professor of Physiology*

HENRY MARTYN BRACKEN, M.D., L.R.C.S. (Edin.), *Professor of Preventive Medicine*

E. D. BROWN, Phm.D., M.D., *Acting Professor of Materia Medica and Pharmacology*

A. B. CATES, A.M., M.D., *Professor of Obstetrics*

JAMES T. CHRISTISON, M.D., *Professor of Diseases of Children*

FREDERICK A. DUNSMOOR, M.D., *Professor of Operative and Clinical Surgery*

CHARLES A. ERDMANN, M.D., *Professor of Anatomy*

BURNSIDE FOSTER, A.B., M.D., *Clinical Professor of Diseases of the Skin and Lecturer upon the History of Medicine*

GEORGE B. FRANKFORTER, M.A., Ph.D., *Professor of Chemistry*

ARTHUR J. GILLETTE, M.D., *Professor of Orthopedic Surgery*

CHARLES L. GREENE, M.D., *Professor of Medicine*

GEORGE D. HEAD, B.S., M.D., *Professor of Clinical Microscopy and Medicine*

CHARLES H. HUNTER, A.M., M.D., *Clinical Professor of Medicine and Chief of Medical Clinic*

JOHN BLACK JOHNSTON, Ph.D., *Associate Professor in Comparative Neurology*

WILLIAM A. JONES, M.D., *Clinical Professor of Nervous and Mental*

FREDERICK LEAVITT, M.D., *Clinical Professor of Obstetrics and Clerk of Clinics*

THOMAS G. LEE, B.S., M.D., *Professor of Histology and Embryology, Secretary of the Faculty, and Librarian, Department of Medicine*

J. C. LITZENBERG, B.S., M.D., *Clinical Professor of Obstetrics and Chief of Dispensary Staff*

ARCHIBALD MACLAREN, A.B., M.D., *Clinical Professor of Surgery*

A. T. MANN, B.S., M.D., *Clinical Professor of Surgery and Clerk of Clinics*

JAMES E. MOORE, M.D., *Professor of Surgery*

WILLIAM R. MURRAY, A.B., M.D., *Clinical Professor of Rhinology and Laryngology*

LOUIS A. NIPPERT, M.D., *Clinical Professor of Medicine*

CHARLES NOOTNAGEL, M.D., *Clinical Professor of Medicine and Physical Diagnosis*

HENRY J. O'BRIEN, M.D., *Clinical Professor of Surgery*

JUSTUS OHAGE, M. D., *Clinical Professor of Surgery*

C. EUGENE RIGGS, A.M., M.D., *Professor of Nervous and Mental Diseases*

PARKS RITCHIE, M.D., *Professor of Obstetrics*

THOMAS S. ROBERTS, M.D., *Clinical Professor of Diseases of Children*

JOHN T. ROGERS, M.D., *Clinical Professor of Surgery*

JOHN L. ROTHROCK, A.M., M.D., *Clinical Professor of Diseases of Women*

JACOB E. SCHADLE, M.D., *Professor of Rhinology and Laryngology*

GEORGE E. SENKLER, M.D., *Clinical Professor of Medicine*

HENRY L. STAPLES, A.M., M.D., *Clinical Professor of Medicine*

J. CLARK STEWART, B.S., M.D., *Professor of the Principles of Surgery*

ALEXANDER J. STONE, M.D., LL.D., *Professor of Diseases of Women*

ARTHUR SWEENEY, M.D., *Professor of Medical Jurisprudence*

H. B. SWEETSER, M.D., *Clinical Professor of Surgery*

FRANK C. TODD, M.D., *Professor of Ophthalmology and Otology*

MAX P. VANDER HORCK, M.D., *Professor of the Diseases of the Skin and Genito-Urinary Organs*

S. MARX WHITE, B.S., M.D., *Associate Professor of Pathology and Bacteriology*

J. FRANK CORBETT, M.D., *Assistant Professor of Surgical Pathology*

IRA H. DERBY, B.S., *Assistant Professor of Chemistry*

H. W. HILL, M.D., *Assistant Professor of Bacteriology*

ARTHUR W. MEYER, A.B., M.D., *Assistant Professor of Anatomy*

WINFIELD S. NICKERSON, ScD., M.D., *Assistant Professor of Histology and Embryology*

M. R. WILCOX, M.D., *Assistant Professor of Physiology*

LOUIS B. WILSON, M.D., *Assistant Professor of Clinical Pathology*

F. H. SCOTT, M.A., M.D., Ph.D., *Assistant Professor of Physiology*

F. L. ADAIR, M.D., *Clinical Instructor in Obstetrics*

E. V. APPLEBY, M.D., *Clinical Instructor in Ophthalmology*

CHARLES R. BALL, M.D., *Clinical Instructor in Nervous and Mental Diseases*

GEO. C. BARTON, M.D., *Clinical Instructor in Gynecology*

A. E. BENJAMIN, M.D., *Clinical Instructor in Diseases of Women*

CHARLES H. BRADLEY, M.D., *Clinical Instructor in Medicine*

JNO. B. BRIMHALL, M.D., *Clinical Instructor in Orthopedic Surgery*

R. A. CAMPBELL, M.D., *Clinical Instructor in Rhinology and Laryngology*

A. R. COLVIN, M.D., *Clinical Instructor in Surgery*

W. H. CONDIT, B.S., M.D., *Instructor in Therapeutics and Materia Medica*

GEORGE M. COON, M.D., *Clinical Instructor in Genito-Urinary Diseases*

J. G. CROSS, M.D., *Clinical Instructor in Medicine*

WARREN A. DENNIS, M.D., *Clinical Instructor in Surgery*

CHAS. F. DIGHT, M.D., *Instructor in Pharmacology*

A. W. DUNNING, M.D., *Clinical Instructor in Nervous and Mental Diseases*

R. E. FARR, M.D., *Clinical Instructor in Surgery*

JAMES GILFILLAN, M.D., *Clinical Instructor in Medicine*

JUDD GOODRICH, M.D., *Clinical Instructor in Surgery*

GEORGE D. HAGGARD, M.D., *Instructor in Physiology*

ARTHUR S. HAMILTON, M.D., *Instructor in Pathology of the Nervous System*

EARLE R. HARE, B.S., M. D., *Instructor in Anatomy*

P. A. HOFF, M.D., *Clinical Instructor in Medicine*

C. E. INGBERT, M.D., *Associate in Neurology*

H. W. JONES, M.D., *Clinical Instructor in Nervous and Mental Diseases*

DAVID LANDO, M.D., *Clinical Instructor in Medicine*

ARTHUR A. LAW, M.D., *Instructor in Operative Surgery*

JEANETTE M. McLAREN, M.D., *Clinical Instructor in Obstetrics*

J. S. MACNIE, M.D., *Clinical Instructor in Diseases of the Eye and Ear*

R. H. MULLIN, B.A., M.B., *Senior Demonstrator in Pathology and Bacteriology*

CHELSEA C. PRATT, M.D., *Junior Demonstrator in Pathology and Bacteriology*

WALTER R. RAMSEY, M.D., *Clinical Instructor in Diseases of Children*

S. P. REES, B.S., M.D., *Instructor in Physical Diagnosis and Clinical Medicine*

H. P. RITCHIE, Ph.B., M.D., *Clinical Instructor in Surgery*

H. E. ROBERTSON, A.B., M.D., *Demonstrator in Pathology*

JULIUS PARKER SEDGWICK, B.S., M.D., *Instructor in Physiological Chemistry and Clinical Assistant in Diseases of Children*

W. D. SHELDON, M.D., *Clinical Instructor in Medicine and Instructor in Therapeutics*

CHAS. N. SPRATT, M.D., *Clinical Instructor in Diseases of the Eye and Ear*

THOS. W. STUMM, M.D., *Clinical Instructor in Medicine*

S. E. SWEITZER, M.D., *Clinical Instructor in Dermatology and Genito-Urinary Diseases*

HENRY L. ULRICH, M.D., *Instructor in Clinical Microscopy*

J. A. WATSON, M.D., *Clinical Instructor in Diseases of Nose and Throat*

VAN H. WILCOX, M.D., *Instructor in Operative Surgery*

H. L. WILLIAMS, M.D., *Clinical Instructor in Diseases of Women*

F. R. WRIGHT, M.D., *Clinical Instructor in Dermatology and Genito-Urinary Diseases*

W. H. AURAND, M.D., *Clinical Assistant in Medicine*

JOHN M. ARMSTRONG, M.D., *Clinical Assistant in Genito-Urinary Diseases*

HERMAN A. BOUMAN, M.D., *Clinical Assistant in Physical Diagnosis*

FRANK E. BURCH, M.D., *Clinical Assistant in Diseases of the Eye and Ear*

PAUL B. COOK, M.D., *Clinical Assistant in Diseases of Children*

L. O. DART, M.D., *Clinical Assistant in Diseases of Children*

EMIL S. GEIST, M.D., *Clinical Assistant in Orthopedia*

E. K. GREEN, A.B., M.D., *Clinical Assistant in Medicine*

ALEX R. HALL, M.D., *Clinical Assistant in Medicine*

JOHN E. HYNES, M.D., *Clinical Assistant in Medicine*

A. E. LOBERG, M.D., *Clinical Assistant in Nervous and Mental Diseases*

H. JOURNEY WELLS, M.D., *Clinical Assistant in Diseases of Eye and Ear*

ARCHA WILCOX, M.D., *Clinical Assistant in Surgery*

CHAS. B. WRIGHT, A.B., M.D., *Clinical Assistant in Diseases of Children*

Clinical and Laboratory Facilities

All of the clinical facilities of the State of Minnesota are now available, all of the medical interests of the state are harmonized, and the highest standards in medical education and development are assured.

The medical group of buildings is located on the University campus overlooking the Mississippi River and is between the business centers of the Twin Cities and connected therewith by two trunk trolley lines which bring the student in ready connection with all of the hospitals of the two cities. The quadrangle contains Millard Hall, Medical Science Building, the Chemistry laboratories, the laboratory of Anatomy and the Institute of Public Health and Pathology, while use is made of the laboratory of Animal Research of the State Board of Health which immediately adjoins the Institute of Public Health and Pathology.

The University Hospital for the College of Medicine and Surgery, the gift of the late Dr. A. F. and Mrs. Elliott and Mr. Walter J. Trask, of Los Angeles, Cal., is in the process of construction at a cost of about \$120,000. The hospital is being located on a site of ten acres overlooking the river and will form a part of the present medical group of buildings. This hospital site of ten acres was purchased by means of a gift of \$50,000 from generous citizens of Minneapolis to the college. Provision for the enlargement of the hospital site and for the acquirement of the land which intervenes between it and the medical quadrangle has already been made by the last state legislature's appropriation of \$450,000 for campus extension.

The University clinical building is located across the river within a few hundred yards of the University. It is owned and controlled by the University and is located in a portion of the city best suited for a satisfactory outdoor service.

The Free Dispensary of St. Paul is advantageously located, thoroughly well equipped and manned and under the control of the college.

The College of Medicine and Surgery is in intimate relationship with the numerous hospitals, infirmaries and dispensaries of the Twin Cities and also with the medical departments of the various state correctional and charitable institutions for which Minnesota is so justly noted. St. Mary's Hospital, Rochester, St. Mary's Hospital, Duluth, and the Duluth Health Department are in close affiliation with the college through their laboratories.

HOSPITALS

The Twin Cities with a population of over 500,000, through their several hospitals, afford clinical service to the amount of 1,620 beds. During the last year important additions have been made to almost every hospital in the two cities, some of them having doubled their capacity.

The hospital facilities of the University are thus exceptionally good, since they are not limited to one large amphitheatre, where but a few students can closely observe diagnostic and surgical methods, but are divided among a number of hospitals where the various professors care for their clinical cases. This makes it possible to divide the classes into small sections, so that each student has equal opportunities of observation and is in close touch with both teacher and patient.

St. Paul City and County Hospital has a capacity of 400 beds and is the largest and most complete of its kind in the northwest. Many of the members of its staff are on the staff of this college and its entire clinical facilities are at the disposal of the college. It enters over 2,000 patients annually, a large proportion of whom are of the emergency order or are suffering from acute disease. The opportunities for bedside instruction are very great and the hospital theatres, which are new and perfectly appointed, are maintained for teaching purposes. A recent and thoroughly modern fireproof pavilion for contagious diseases is provided, where the students have unexcelled opportunities to study diphtheria, scarlatina, erysipelas, etc. A separate building is provided for midwifery, and senior students see labor cases under the personal supervision of the professor or instructor in obstetrics.

The orthopedic department contains a large number of crippled and deformed children, and houses the State Hospital for Crippled and Deformed Children. All of this work is under the control of the Professor of Orthopedic Surgery of this college.

The City Hospital, Minneapolis, places its entire clinical material at the command of the clinical teachers of the University. It is a large, thoroughly modern hospital with splendid equipment and has a capacity of 200 beds. During the year 1906, 1,836 patients were treated in the hospital, and 2,450 patients in the out-patient department and hospital dispensary. A new administration building has just been completed by the city at a cost of \$55,000, and a pavilion for the care of the incurable is planned for early completion. A modern, newly-erected contagious ward furnishes excellent opportunities for bedside clinical instruction in contagious diseases under the direction of the professor of diseases of children. In the City Hospital, bedside and amphitheatre, medical or surgical clinics are conducted daily throughout the year by members of the faculty. Clinics in diseases of the skin, nervous diseases, obstetrics,

etc., are likewise given in the hospital throughout the school year. A special feature is made of medical bedside clinics in the wards of the hospital to small sections of senior students, during the year, by members of the faculty.

Asbury Methodist Hospital, Minneapolis, affords clinical material for the State University. The authorities have recently erected a large and beautiful building, only a portion of which is as yet occupied. It has a capacity of 160 beds, and, when the building is entirely completed, the hospital will have a capacity of nearly 350 beds. Many members of the faculty are on the staff of the hospital and give clinics.

St. Joseph's Hospital, St. Paul, with 130 beds and one of the finest amphitheatres with every modern device, contributes largely to the clinical instruction. Members of the faculty are on the staff and give clinics there to the students.

Northwestern Hospital, Minneapolis, affords splendid surgical material, available to this college alone. Semi-weekly clinics in surgery are given in its amphitheatre, and in three operating rooms and wards, by members of the faculty. It has a capacity of 100 beds and during 1906 treated 1,000 patients.

St. Luke's Hospital, St. Paul, with a capacity of 100 beds, is largely devoted to surgical clinics. Clinics of this college are held in this hospital by many members of its staff who are on the college faculty. Two operating rooms, with conveniences for students, give unusual facilities and a service of the highest order.

The Swedish Hospital, Minneapolis, with a capacity of 115 beds, is housed in a newly-constructed modern building and members of this faculty exclusively utilize the material of the hospital for teaching purposes. During the year 1906 1,456 patients were treated.

St. Barnabas Hospital, Minneapolis, with a capacity of 100 beds, furnishes medical and surgical material for clinics to junior and senior classes of the University. Clinics are held throughout the college year. During the preceding year 1,617 patients were treated at this hospital.

St. Mary's Hospital, Minneapolis, also furnishes clinical material for the University. The hospital is located directly across the Mississippi River from the new University Hospital. It has a capacity of 100 beds and treated 1,200 patients during the last year.

The Norwegian Hospital, Minneapolis, is being erected immediately across the river from the new University Hospital. Among other things it provides a sanatorium, now completed, for the treatment of tuberculosis.

DISPENSARIES

In its clinical instruction the medical department makes use of two well-organized free dispensaries, each having a large outdoor service. The University clinical building is located across the river from the medical department proper at 1810 Washington Ave. S. It is a three-story building, 40x150 feet, situated in a thickly populated part of Minneapolis, and receives 2,500 new patients per year or an average of 33 daily. The staff is composed exclusively of the members of the faculty and their assistants and is organized under a chief of staff.

The service is divided into medical, surgical, gynecological, eye and ear, nose and throat, skin and venereal, mental and nervous departments. Senior students are required to attend daily the clinics at the free dispensary. They are drilled in the taking of histories, the making of physical examinations, etc. Sections of senior students are assigned each day to the drug room of the dispensary and to the laboratory of clinical microscopy, located in the basement of the building. The free dispensary also provides a residence service for senior students, which is elective and open to a limited number of the senior students. Students electing this service are required to reside at the dispensary and attend the emergency, sick and accident calls, under the direction of a resident, graduate, qualified house officer. This appointment is open to the graduates of this college. An obstetrical out-service department is also conducted and obstetrical cases are assigned to sections of senior students. These clinics are conducted under the direction of some member of the obstetrical staff.

The St. Paul Free Dispensary is centrally located in a twenty-room building, and its clinical service is wholly under the control of the staff of University instructors. Forty patients daily are treated throughout the year. The students of the third and fourth years are on duty two days per week at this dispensary and for certain of the clinical divisions attend every day.

CLINICAL OPPORTUNITIES*

Clinical records are kept by each member of the junior and senior classes, in which are listed the cases seen, with dates, name of instructor, name of hospital, and other important data. These records must be filed with the heads of departments and finally in the dean's office.

During the year 1906-07 these records were carefully kept and, in order to gain an idea of the opportunities which a single student might expect to have at his disposal, the record of one of the senior students, taken at random, has been analyzed. It is not exceptional, but may be taken as representative.

Seven hundred and twenty-eight cases have been reported by this single member of the senior class as coming under his observation and study during a period of nine months. This number by no means represents the total of clinics, but simply those seen by him alone, nor are any of the junior year clinics included. Approximately, it is the work done by every member of the class, although the clinical instruction is constantly varying because of the small sections and individual teaching which form the basis of modern methods. Indeed, comparatively few clinical lectures are given to the class as a whole. Students come in close relation with patients and study them much the same as though the cases were their own.

The College of Medicine and Surgery

The following is a summary of the clinics as reported by this student :

	Number of Cases.	Number of Instructors.	Number of Hospitals and Dispensaries.
Internal medicine	168	13	8
Surgery	158	16	11
Orthopedia	48	4	4
Pediatrics	33	3	4
Neurology	68	7	4
Skin, Venereal and Genito-Urinary.....	72	11	5
Nose and throat	61	5	4
Gynecology	40	8	5
Eye and ear	70	3	3
Obstetrics	10	5	4
	<hr/>	<hr/>	<hr/>
Total.....	728	75	

MINNEAPOLIS CLINICS.

Monday	11:30-12:30	Pediatrics	Prof. Roberts, Dr. Dart	1 sec. Srs.	City
"	1:00-2:00	Medicine (bedside)	Prof. White	1 sec. Srs. 2d qu.	City
"	4:00-5:00	Medicine "	Prof. White	1 sec. Srs. 1st & 3d q.	City
"	" "	Pediatrics "	Dr. Sedgwick	1 sec. Srs. 3d qu.	City
"	" "	Medicine "	Dr. Sheldon	1 sec. Srs. 1st qu.	City
Mon. & Thu	1:00-3:00	Medicine	Prof. Head, Drs. Aurand and Hynes	2 secs.	Clin. Bldg.
"	" "	Surgery	Dr. Condit	Section	" "
"	" "	Nose and Throat	Dr. Campbell	Section	" "
Mon., Wed. and Friday	" "	Pediatrics	Dr. C. B. Wright	Section	" "
"	" "	Eye and Ear	Dr. Macnie	Section	" "
"	" "	Skin and Venereal	Dr. F. R. Wright	Section	" "
"	" "	Nervous & Mental	Dr. Hamilton	Section	" "
"	" "	Gynecology	Dr. Benjamin	2 Students	" "
"	" "	Orthopedics	Dr. Geist		" "
Daily	" "	Clin. Microscopy	Dr. Ulrich	1 Section	" "
Tuesday	12:30-1:30	Physical Diagnosis	Prof. Nootnagel	1/2 Class Js	City
"	1:00-2:00	Medicine	Dr. Sheldon	1 sec. Srs. 2 qu.	City
"	" "	Pediatrics	Dr. C. B. Wright	1 sec. Srs.	City
"	4:00-5:00	Pediatrics	Dr. Sedgwick	1 sec. Srs. 1st & 4th q.	City
"	" "	Medicine (bedside)	Prof. White	1 sec. Srs. 4th qu.	City
"	" "	Medicine "	Dr. Cross	1 sec. Srs. 1st & 4th q.	Clin. Bldg.
Tues. & Fri.	1:00-3:00	Medicine	Dr. Rees Dr. Bowman	Section	" "
" "	" "	Surgery	Dr. Law	Section	" "
" "	" "	Nose and Throat	Prof. Murray	Section	" "
Tues., Thur. & Saturday	" "	Pediatrics	Dr. Dart	Section	" "
"	" "	Eye and Ear	Dr. Wells	Section	" "
"	" "	Skin and Venereal	Dr. Sweitzer	Section	" "
"	" "	Gynecology	Dr. Williams	2 Students	" "
"	" "	Nervous & Mental	Prof. W. A. Jones or Dr. Loberg	Sec. or Cl.	" "
Wednesday	11:30-12:30	Contag. Diseases	Prof. Roberts, Dr. Dart	1 sec. Srs.	City
"	12:30-1:30	Physical Diagnosis	Prof. Nippert	1/2 Cl. Js.	Clin. Bldg.
"	1:00-2:00	Medicine (bedside)	Dr. Sheldon	1 sec. Srs. 2 qu.	City

MINNEAPOLIS CLINICS.

Wednesday	1:00—2:00	Pediatrics (bedside)	Dr. Sedgwick	1 sec. Srs. 2 qu.	City
"	4:00—5:00	Medicine "	Dr. Cross	1 sec. Srs. 3 qu.	City
"	1:00—3:00	Medicine	Prof. Nippert Dr. Green	2 sections	Clin. Bl
Wed. & Sat.	" "	Surgery	Prof. Mann Dr. Goehrs	Section	" "
"	" "	Nose and Throat	Dr. Parker	Section	" "
Thursday	8:30—10:30	Med. & Th'rp'utics	Dr. Sheldon	$\frac{1}{4}$ Cl.	City
"	10:30—12:00	Gynecology	Dr. Benjamin	$\frac{1}{4}$ Cl.	N. W.
"	8:30—10:30	Eye and Ear	Prof. Todd	$\frac{1}{4}$ Cl.	N. W., A
"	10:30—12:00	Medicine	Dr. Rees	$\frac{1}{4}$ Cl.	City
"	8:00—10:30	Medicine	Prof. Bell Prof. Nootnagel Dr. Rees	$\frac{1}{4}$ Cl.	City
"	11:00—12:00	Nose and Throat	Prof. Murray		City
"	1:00—2:00	Medicine	Prof. Hunter	$\frac{1}{4}$ Cl.	Asb., C
"	" "	Surgery	Prof. Mann	$\frac{1}{4}$ Cl.	St. Barn
"	" "	Medicine	Prof. Head	$\frac{1}{4}$ Cl.	City
"	2:00—3:00	Nervous & Mental	Dr. W. A. Jones	Class	Clin. Blo
"	3:00—4:00	Dermatology	Prof. Wright	Class	City, Cli
"	4:00—6:00	Autopsies	Prof. White	1 section	City
Friday	11:00—12:00	Contag. Diseases	Prof. Roberts or Dr. Dart	1 sec. Srs.	City
"	12:00—1:30	Physical Diagnosis	Dr. Rees	$\frac{1}{4}$ Cl. Jrs.	Clin. Blo
"	1:00—2:00	Medicine (bedside)	Dr. Cross	1 sec. Srs. 2 qu.	City
Saturday	8:30—10:30	Surgery	Prof. Dunsmoor	$\frac{1}{4}$ Cl.	Swedish
"	8:30—10:00	Medicine	Prof. Nippert	$\frac{1}{4}$ Cl.	City
"	" "	Medicine	Prof. Head	$\frac{1}{4}$ Cl.	City
"	10:30—12:00	Surgery	Prof. Moore	$\frac{1}{4}$ Cl.	N. W.
"	" "	Gynecology	Prof. Abbott or Dr. Williams	$\frac{1}{4}$ Cl. 3 mo.	City
"	" "	Surgery	Dr. Farr	$\frac{1}{4}$ Cl. 3 mo.	St. Mary
"	1:00—2:30	Pediatrics	Dr. Dart	$\frac{1}{4}$ Cl.	Clin. Blo
"	" "	Medicine	Prof. Staples, Dr. Cross	$\frac{1}{4}$ Cl.	City
"	" "	Surgery	Prof. Stewart	$\frac{1}{4}$ Cl.	City or N
"	2:30—3:30	Obstetrics	Prof. Litzenb'g	$\frac{1}{4}$ Cl.	City or Clin
"	" "	Orthopedics	Dr. Geist	$\frac{1}{4}$ Cl.	Clin. Blo
"	1:00—6:00	Autopsies	Prof. White	$\frac{1}{4}$ Cl.	City

Parturition clinics throughout the year by Prof. Litzenberg and Dr. A. for Seniors at City Hospital and in the out-patient service.

ST. PAUL CLINICS.

Thursday	9:00-12:00	Orthopedics	Prof. Gillette	Class	Every 3rd week during entire year. City Hospital.
"	"	Surgery	Prof. MacLaren	½ Class	Two weeks out of three during entire year. St. Luke's Hospital.
"	"	"	Prof. O'Brien	½ Class	Two weeks out of three during entire year. St. Joseph's Hospital.
"	10:15-12:00	Gynecology	Prof. Rothrock	Class	Two weeks out of three, after Jan. 1st. City Hospital.
"	1:30-3:30 (until Jany.) 1:30-2:30 (after Jany.)	Ophthalmology	Dr. Appleby	Section	Every week during year. Dispensary.
"	1:30-3:00	Gen. Urin.	Dr. Coon	Section	Every week after January 1st. City Hospital.
"	3:00-4:00	Medicine	Prof. Abbott	Class	"
Thur. & Sat.	1:30-3:00	Medicine	Prof. Greene	Section	"
"	"	"	"	Section	Every week until January 1st. Dispensary.
"	1:30-3:00 (until Jany.) 1:30-2:30 (after Jany.)	"	Dr. Hoff	Section	Every week during year. Dispensary.
"	Same hrs.	"	Dr. Hall	Section	"
"	"	Ear, Nose, Throat	Prof. Schadle	Section	"
"	"	Nervous & Ment'l	Dr. Dunning	Section	"
"	1:30-3:00	Surgery	Dr. Goodrich	Section	Every week until January 1st. Dispensary.
"	1:30-2:30	"	Dr. Dennis	Section	Every week after January 1st. Dispensary.
"	1:30-3:00	Children	Prof. Christison	Section	Every week until January 1st. Dispensary.
"	1:30-2:30	Nervous & Ment'l	Dr. Ball	Section	Every week after April 1st. Dispensary.
"	1:30-3:00	Surgery	Dr. Colvin	Section	Every week after January 1st. City Hospital.
"	"	Children	Dr. Cook	Section	Every week until January 1st. City Hospital.

ST. PAUL CLINICS.

Thur. & Sat.	1:30-3:00	Gen. Urin.	Dr. Armstrong	Section	Every week until January 1st at City Hospital
"	4:00-5:00	Medicine	Prof. Abbott	Section	Every week after January 1st at City Hospital
"	"	Obstetrics	Prof. Leavitt	Section	"
"	"	Children	Prof. Senkler	Section	"
"	"	Eye and Ear	Dr. Burch	Section	"
"	"	Surgery	Dr. Ancker	Section	"
Saturday	9:00-10:00	Nervous & Ment'l	Prof. Riggs	Class	Every wk. until Jan. 1st at Dispensary. after Jan. 1, City Hospital
"	11:15-12:00	Surgery	Prof. Rogers	Class	Every week until Jan. 1st, at St. Luke, after Jan. 1st, at City Hospital
"	"	Surgery	Prof. Ohage	Class	
"	1:30-3:00 (until Jany.) 1:30-2:30 (after Jany.)	Skin and Ven.	Prof. Foster	Section	Every wk. during year. Dispensary.
"	3:00-4:00	Medicine	Prof. Greene	Class	Every wk. after Jan. 1st, City Hospital.

Gynecology. Prof. Stone at St. Joseph's Hospital.

Gynecology. Prof. Rothrok and Dr. H. P. Ritchie, daily clinic at Dispensary. (One student 1:00 to 2:00.

Parturition clinics throughout the year at City Hospital, Maternities, and Dispensary out-serv with Prof. Leavitt and Dr. Jeanette McLaren. (One to five students.)

DISPENSARY CLINICS *

At the University Clinical Building from 1:00 to 3:00 p. m.

FIRST AND SECOND SEMESTERS, 1908-1909

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
Medicine	Prof. Head Dr. Aurand Dr. Hynes	Dr. Rees and Dr. Bouman	Prof. Nip- pert and Dr. Green	Prof. Head Dr. Aurand Dr. Hynes	Dr. Rees and Dr. Bouman	Dr. Shel- don and Dr. Adair	2 Sections
Surgery	Dr. Condit	Dr. Law	Dr. Mann	Dr. Condit	Dr. Law	Dr. Green and Dr. Goehrs	1 Section
Nose & Throat	Dr. Campbell	Dr. Murray	Dr. Parker	Dr. Campbell	Prof. Murray	Dr. Parker	1 Section
Pediatrics	Dr. C. B. Wright	Dr. Dart	Dr. C. B. Wright	Dr. Dart	Dr. C. B. Wright	Dr. Dart	1 Section
Eye and Ear	Dr. Macnie	Dr. Wells	Dr. Macnie	Dr. Wells	Dr. Macnie	Dr. Wells	1 Section
Skin and Venereal	Dr. F. R. Wright	Dr. Sweitzer	Dr. F. R. Wright	Dr. Sweitzer	Dr. F. R. Wright	Dr. Sweitzer	1 Section
Neurology	Dr. Hamilton	Dr. W. A. Jones or Dr. Loberg	Dr. Hamilton	Dr. W. A. Jones or Dr. Loberg	Dr. Hamilton	Dr. W. A. Jones or Dr. Loberg	1 Section
Gynecology	Dr. Benjamin	Dr. Williams	Dr. Benjamin	Dr. Williams	Dr. Benjamin	Dr. Williams	2 Students
**Practical Dispensing	Mr. Bachmann	Mr. Bachmann	Mr. Bachmann	Mr. Bachmann	Mr. Bachmann	Mr. Bachmann	2 Students
Clinical Microscopy	Dr. Ulrich	Dr. Ulrich	Dr. Ulrich	Dr. Ulrich	Dr. Ulrich	Dr. Ulrich	2 Students
Orthopedics	Dr. Geist		Dr. Geist		Dr. Geist	Dr. Geist	1 Section

*These clinics have been included for the most part in the list of Minneapolis clinics already given.

**The dispensary drug room is under the supervision of the University College of Pharmacy, as also this practical teaching.

LIBRARY OF MEDICAL DEPARTMENT

Thomas G. Lee, B.S., M.D., Librarian

The medical library consists of the following collections: The general clinical library, the libraries of the colleges of Dentistry and Pharmacy, the departmental libraries of pathology and bacteriology, histology and embryology, anatomy, and physiology. These contain nearly 10,000 bound volumes, 14,000 unbound volumes, monographs, reprints, dissertations, etc., and about 175 current periodicals. In addition to the above, the libraries of the State Board of Health, of Hennepin County Medical Society, containing 4,000 volumes and 50 journals, and of the Ramsey County Medical Society with some 7,000 volumes and 150 journals, give the student additional opportunity to consult all the more important medical publications.

The general University library contains some 115,000 bound volumes, 30,000 unbound volumes and pamphlets, and several hundred current periodicals. The public libraries of Minneapolis, with 160,000 volumes, and of St. Paul, with some 90,000 volumes, the State Historical Library of 85,000 volumes, and the State Library of 59,000 volumes, the Library of the Minnesota Academy of Natural Sciences of some 12,000 titles, place before the student the greater part of the important literature relating to all branches of the physical and natural sciences as well as works of general culture and those pertaining particularly to medicine. All of these collections are readily accessible to the student.

A noteworthy addition to the medical library is the recent acquisition by the department of histology and embryology, through the generosity of Alfred F., John S. and Charles C. Pillsbury, of a large portion of the working library of the late Professor William His, of Leipzig, containing about 8,500 titles and representing some 2,500 authors.

LABORATORY BUILDINGS AND EQUIPMENT

Over \$500,000.00 is invested in the laboratories and equipment of this college exclusive of site.

The location of the medical buildings in a central portion of the campus offers all the advantages to student and staff which come from a close association with the other University departments, such as general library, laboratories of physics, chemistry, biology, botany, geology, etc.

Millard Hall, a large, four story, brown stone, and cream brick building, (65x125 ft.) the oldest of any in the group, contains a faculty room, a large amphitheatre and lecture rooms, library and reading rooms of the department together with the laboratory of pharmacology and materia

medica. In addition the College of Dentistry and the College of Homeopathic Medicine and Surgery are temporarily provided with rooms.

The Medical Science Building, a large, four-story, brick building, (75x150 ft.), is especially designed for laboratories. The building houses the department of histology and embryology and the department of physiology of this college. A portion of the south wing is temporarily occupied by the College of Pharmacy.

The department of histology and embryology occupies the four floors of the north wing and a part of the center of the building and the department of physiology occupies the greater part of the south wing and the center of the building.

Chemistry is taught in two buildings. The main, four-story, brick building (198x78 ft.) constitutes the headquarters of the School of Chemistry. The laboratory of medical chemistry is a one-story, brick building devoted to the use of this department and is included as a part of the Medical Quadrangle. It is equipped with an amphitheatre, two teaching laboratories (3,800 sq. ft.), preparation rooms, balance room, storage rooms and private offices of the staff of this department.

The laboratory of anatomy is a two-story, basement building.

The Institute of Public Health and Pathology is the newest of an in, the Medical Quadrangle.

SIX-YEAR COURSE IN SCIENCE AND MEDICINE LEADING TO THE DEGREES OF BACHELOR OF SCIENCE AND DOCTOR OF MEDICINE

In the year 1903-04 the University established a six-year course of study arranged especially for students of medicine. The first two years of the course are given in the College of Science, Literature and the Arts, and the last four years are given in the College of Medicine and Surgery. It leads to the degree of bachelor of science at the end of the first four years, and to the degree of doctor of medicine at the end of the six-year course.

In the College of Science, Literature, and the Arts the year is divided into two semesters. In the College of Medicine and Surgery the year is divided into four quarters (half semesters). In the College of Medicine and Surgery the work is given on a concentration plan, but two subjects being carried at a time, and consequently a greater number of hours per week.

Students who enter without French or German are required to take Beginning German, Course 1, ten credits, and Scientific German, Course 3, six credits.

Students entering with two years of German may take Beginning French, Course 1, ten credits, in either first or second year, and German, Course 3, six credits, in the other year.

Seven-Year Course Leading to the Degrees of A. B. and M. D.

Seniors in the College of Science, Literature and the Arts and in other colleges, who contemplate entering the College of Medicine and Surgery, are permitted to elect courses in anatomy, histology and embryology, physiology and chemistry in this college in lieu of similar science courses in the College of Science, Literature and the Arts or in other colleges. Since the medical practice act of this state requires full four years of medical study, these students must elect this work in the College of Medicine and Surgery, in order that it may be contributive toward the two degrees given in both colleges.

AFFILIATION WITH OTHER COLLEGES

Carleton College has entered into an arrangement with the University of Minnesota whereby students from Carleton who have completed three full years' work without conditions and who have also met all the requirements for admission to the College of Medicine and Surgery may elect as the work of their Senior year the first year's work in the College of Medicine and Surgery, upon the satisfactory completion of which they will receive a bachelor's degree from Carleton College.

By this arrangement students from this college, having satisfactorily completed their four years' work in the College of Medicine and Surgery, will have received both degrees in a period of seven years.

Opportunity is offered to other colleges meeting the University requirements to enter into similar relations of affiliation for the purpose of shortening the time whereby a student can secure both degrees.

CURRICULUM

The course in the College of Medicine and Surgery leads to the degree of doctor of medicine. It covers a period of four years of collegiate study, each year representing nine months in actual residence.

The studies are graded, so far as practicable, throughout the four years and this grading is arranged with careful reference to the relation which the subjects naturally bear to each other.

The work of the first two years deals with the so-called scientific or laboratory branches; while that of the last two years includes the principles and practice of medicine and surgery, their associated specialties and the application of scientific or laboratory methods to clinical experience.

GRADED SYSTEM OF STUDY

The year is divided into four periods of nine weeks each, called quarters. The credit value of each course is computed in terms of credits in the College of Science, Literature, and the Arts.

FIRST YEAR

FIRST QUARTER

Anatomy 1, six credits, Professor Erdmann, Dr. Hare

Anatomy 2, three credits, Professor Erdmann, Dr. Hare

Embryology 11, four and one-half credits, Professor Lee, Associate Professor Johnston

Histology 1, four and one-half credits, Professor Lee and Assistant Professor Nickerson

SECOND QUARTER

Anatomy 3, seven and one-half credits, Assistant Professor Meyer, Dr. Hare and Tyrell

Embryology 12, three credits, Professor Lee, Associate Professor Johnston

Histology 2, four and one-half credits, Professor Lee, Assistant Professor Nickerson

Neurology 21, three credits, Associate Professor Johnston, Dr. Ingbert

THIRD QUARTER

Chemistry 6, fifteen credits, Professor Frankforter, Assistant Professor Derby, Mr. Handy

Physiology 1, four and one-half credits, Professor Beard, Assistant Professor Wilcox, Dr. Sedgwick

Physiology 2, four and one-half credits, Professor Beard, Assistant Professor Wilcox, Dr. Sedgwick

FOURTH QUARTER

Chemistry 6, continued

Physiology 3 and 4, nine credits, Professor Beard, Assistant Professor Wilcox, Dr. Sedgwick

SECOND YEAR

FIRST QUARTER

Neurology 22, four and one-half credits, Associate Professor Johnston, Dr. Ingbert

Pharmacology 1, four and one-half credits, Professor Brown

Physiology 5 and 6, nine credits, Professor Beard, Assistant Professor Wilcox, Dr. Sedgwick

SECOND QUARTER

Chemistry 7, three and three-quarter credits, Professor Frankforter, Assistant Professors Harding and Derby

Physiology 7 and 8, nine credits, Professor Beard, Assistant Professor Wilcox, Dr. Sedgwick

THIRD QUARTER

Anatomy 4, nine credits, Assistant Professor Meyer, Drs. Hare and Tyrell
Embryology 13, four and one-half credits, Professor Lee
Histology 3, four and one-half credits, Professor Lee

FOURTH QUARTER

Pathology 1, three credits, Professor Wesbrook
Pathology 2, three credits, Dr. Mullin, Dr. Robertson
Pathology 3, three credits, Professor Wesbrook, Drs. Mullin and Robertson
Bacteriology 4, three credits, Assistant Professor Hill, Dr. Pratt
Bacteriology 5, four and one-half credits, Professor Wesbrook, Assistant Professor Hill, Dr. Pratt

For the statement of the courses of the third and fourth years the schedules and detailed announcements must be consulted.

THIRD YEAR

Topographical anatomy, special pathology and bacteriology, surgical pathology, principles of surgery, operative surgery, practice of surgery, practice of medicine, diseases of children, obstetrics, pathology of the nervous system, special neurology, medical jurisprudence, physical diagnosis, pharmacology and therapeutics, electives.

FOURTH YEAR

Practice of surgery, practice of medicine, clinical obstetrics, surgical pathology, practical physical diagnosis, therapeutic conferences, nervous and mental diseases, gynecology, ophthalmology and otology, clinical microscopy, orthopedia, dermatology and genito-urinary diseases, diseases of the nose and throat, hygiene, electives.

COLLEGE YEAR

The twenty-first annual course of study in this college will begin on **Tuesday, September 14, 1908**, and will continue nine months, or thirty-six weeks, exclusive of holidays, closing upon **Saturday, June 5, 1909**. The college year is divided into two semesters; each semester is further divided into two quarters of nine weeks each; the first semester ends **January 30, 1909**. The last week is devoted mainly to mid-year examinations, which will be conducted in many of the departments. The second semester will begin **February 2, 1909**, and will close **June 5, 1909**. Certain of the courses of study terminate on **November 14th**, and **April 3d**. Commencement exercises will occur in common with the other departments of the **University**, during the week ending **June 11, 1909**.

Rules and Regulations of the College

REQUIREMENTS FOR ADMISSION

I. Candidates for admission to the College of Medicine and Surgery who have received degrees in arts or science from approved universities or colleges will be admitted on presenting their diplomas or other satisfactory testimonials (subject to conditions under IV).

II. Students will be admitted who present evidence that they have satisfactorily performed the equivalent of at least two full years of work of collegiate grade of fifteen hours per week (subject to conditions under IV).

III. Other candidates who have not completed the two years of required work will be required to pass examinations, conducted by the College of Science, Literature and the Arts, upon such subjects as may be lacking (subject to conditions under IV).

IV. All candidates for admission must furnish evidence that they have completed one year of at least three credit* hours per week in each of the following named subjects, either in this University or in some other college or university of equal rank:

1. Physics
2. General Inorganic Chemistry
3. Qualitative Analysis
4. Biology, i. e., Zoology or Botany
5. Language, i. e., German or French

Since the two years of required collegiate work must include the aforementioned subjects, students are advised to choose the prescribed six-year course which leads to the degrees of bachelor of science and doctor of medicine. For detailed outline of this course see pages 28-33.

V. In addition students must offer for entrance two years of Latin.

VI. Candidates may be allowed to enter with not more than one condition in the second year of academic work. This condition, however, must be removed before the beginning of the second-year work in medicine.

For regulations governing admission to the College of Science, Literature and the Arts, and detailed information concerning its curriculum, see the bulletin of that college.

ENROLLMENT

Students are advised to matriculate or register in the office of the University Registrar on or before September 7, 1908. Entrance and condition examinations will be held September 7 to 12. Opening lecture

* NOTE.—A credit hour in a laboratory subject is taken to be two or more hours of consecutive work.

September 14. Classes called for regular work on September 15.

Students are fined twenty-five cents per day who matriculate or register in the Registrar's office after September 14, 1908, for the first semester's work, or after February 2, 1909, for the second semester's work.

MATRICULATION

Students who are entering the College of Medicine and Surgery for the first time must present to the Registrar satisfactory evidence of having completed the required amount of work for admission, and obtain proper classification card and statement of fees. The Registrar will determine and record any deficiency in the entrance qualifications of a student, and will arrange with the student for the removal of such deficiencies.

Students who have matriculated in previous years must first present registration slips and obtain statement of fees in the Registrar's office at the beginning of each semester.

REGISTRATION

The registration of all students consists of three parts and should be carried out in the following order:

1st. Present registration slip to the Registrar and secure a statement of fees.

2nd. Present this statement at once to the cashier and pay fees.

3rd. Report to the dean at once for final classification and registration. Students must follow this order and complete registration as promptly as possible in order to secure tickets for entrance to the various courses.

NOTE.—If there is any sufficient reason for temporary delay in payment of fees, the student must report at once to the Dean.

As the rules of the Minnesota State Board of Medical Examiners and of the Council on Medical Education of the American Medical Association, and the examining boards of several other states require four full years' work in a medical college, students are not given time credit for work done outside a medical school. However, when a student presents *satisfactory* evidence of good work done elsewhere, he may be given *subject credit* for such work, and be permitted to take *optional* or *advanced work* in the branches and for the time in which he has received subject credit. It is consequently of considerable advantage to a student to be able to present subject credits.

No student may be advanced with his class or given advanced standing unless he has passed the majority of the required studies of the previous year; nor shall any student be admitted to the second semester's work of the fourth year who has any unremoved conditions of any of the preceding years.

TERMS OF TUITION

The annual tuition fee in the College of Medicine and Surgery is one hundred dollars. This includes all charges for matriculation, lecture and laboratory courses, dissections and graduation, except a hospital fee three dollars for juniors and seniors and a rental fee for microscope payable by all students who do not own their own instruments. (microscope rental.)

One-half of the annual fee will be payable when the student matriculates. The cashier's receipt for this portion of the fee will entitle holder to take the entrance examinations and to classify. The second half will be payable at the opening of the second semester, February 2, 1919. Failure to register within the dates assigned for registration will subject the delinquent to an increase in the registration fee, amounting to twenty-five cents for each day of such delinquency. If the applicant fails to pass the entrance examination, his fees will be returned by the cashier. Absence or failure to continue study will not entitle the student to return of fees, except in cases of special hardship, when application may be made to the executive committee of the Board of Regents.

A student who takes advanced standing will not receive any credit therefor upon his annual fees.

The fee of one dollar is charged for permission to take any examination to remove a condition. The student obtains a fee statement from the Registrar for the conditions charged against him, this he presents to the cashier, and the cashier's receipt must be registered with the Dean at least twenty-four hours prior to the examination.

Special examinations may be ordered by the faculty under exceptional circumstances for which a fee of five dollars must be paid to the University cashier.

MICROSCOPE RENTAL

To students who do not own their own instruments, microscope fees are charged as follows: First year, first semester, four dollars, second year, first semester, three dollars; second semester, four dollars; third year, first semester, four dollars. Fourth year, clinical microscopy, two dollars.

In all elective courses requiring the use of microscopes, the fee of two dollars for each course is charged.

BREAKAGE AND LOSS

In each laboratory course the student will be assigned a certain amount of apparatus and material, for which he will give a receipt.

For apparatus and material attaching to his laboratory desk he will also be held responsible. At the end of each course, if such apparatus and

material are restored in good condition, this receipt will be returned to him.

A deposit of five dollars will be made with the University cashier each year, by every student, at the time of enrollment as a caution fee. This fee is intended to cover the cost of unnecessary damage in the college buildings and of breakage and loss of laboratory apparatus and materials. It will be returned to the student at the close of each year, minus the cost of articles assigned to him, which are not returned in good condition, or of damage to college property for which he is individually responsible. If responsibility for such damage cannot be individually fixed, a pro rata charge upon all students will be made.

GRADUATE AND SPECIAL STUDENTS

Special students will pay to the cashier a fee of twenty dollars per year for each study they elect to pursue. They will be charged additional fees, varying from five to twenty dollars, for each laboratory course they may enter.

Graduate students will pay an admission of ten dollars, which will entitle them to attend any lectures they may desire in regular courses.

Additional charges varying from ten to twenty dollars per course are made for laboratory courses, and microscope rental must also be paid.

EXAMINATIONS—FINAL STANDINGS

No student with an entrance condition will be allowed to register for any second-year subject, nor will any student with any first-year condition or failure be allowed to register for a third-year subject; nor will any student having a second-year condition or failure be allowed to register for any fourth-year subject.

No student will be allowed to omit any freshman work in order to make up entrance conditions, except by special permission of the department affected.

Habitual absence without satisfactory excuse, continued indifference to study, or persistently poor scholarship will subject the student to temporary or permanent suspension.

Students will not be permitted to substitute private work in any branch for the regular college courses.

Final examination in every required subject is held at the close of the work at the end of the semester or quarter, according to the extent of the course given. Opportunity is offered to remove conditions at the opening of the school year in September. The examinations at the end of the semester or quarter are only for those who are taking the courses, while the September examinations are only for those who are attempting to remove conditions or are applicants for advanced standing.

The final standing of any student in a given subject shall be determined as the result of his (a) practical work (laboratory or clinical), (b) recitations, and (c) oral or (d) written examinations.

All of these factors shall be taken into consideration in making up the final grading in any subject.

Students' standings shall be determined at the end of the year by a conference of the heads of the departments in which the work is pursued during that year.

All standings shall be reported officially to and from the registrar's office at the end of the year.

Students shall be reported as Passed, Incomplete, Conditioned or Failed.

No student will be registered for any examination to remove conditions until he presents a receipt from the cashier for the fee for said examination. (See Terms of Tuition.)

Conditions must be removed at the beginning of the school year in September. No student who has any conditions unremoved at the close of this examination is allowed to continue with his class without the express permission of the dean on the recommendation of the department concerned.

A condition not removed at the first opportunity becomes a failure subject to the rule governing failures.

Failures necessitate the taking of the work again in class.

A student repeating work, by reason of having failed, must pay the fees connected with that course.

A student who is conditioned in the majority of the subjects given in any year will become a "failed" student and must repeat the whole work of that year.

Students who carry failures into a succeeding year may find a resultant conflict of study hours; in that event they will give preference to the unfinished studies of the lower conflicting course.

ADVANCED STANDING

All persons applying for advanced standing must present satisfactory evidence of time spent in medical studies, as well as official credentials, their own records, notes, drawings, and other evidence of work covered and pass examinations in the branches already taken by the class they seek to enter and satisfy all other admission requirements, but any student who has satisfactorily completed the requirements of any department of this college in any other medical college of recognized standing may be excused from repeating such examinations if the instruction

which he has received is considered satisfactory by the head of the corresponding department in this college.

No condition of advanced standing will entitle the student to take the two years of any graded study coincidently.

Seniors in the College of Science, Literature, and the Arts, or in other recognized colleges, who contemplate entering the department of medicine, are permitted to elect courses in anatomy, histology, embryology, neurology, physiology and chemistry in this department in lieu of equivalent science courses in the College of Science, Literature, and the Arts or in other colleges.

REQUIREMENTS FOR GRADUATION

The degree of doctor of medicine is conferred by the Board of Regents upon the students who are recommended by vote of the faculty for graduation. Candidates for the degree must possess the following qualifications:

Every candidate for the degree of doctor of medicine must be at least twenty-one years of age, and of good moral character. He must have satisfied all the requirements for admission to the College of Medicine and Surgery, and have completed in a satisfactory manner the full four years' course of study in this college.

The degree of doctor of medicine will also be given to candidates who have completed a portion of their medical work in some other recognized medical school, provided that they have satisfied all entrance requirements and have completed a four years' course of medical study equivalent to the standards maintained here, of which the final year must be spent in this college.

A graduate of another medical school of recognized standing may obtain the degree of doctor of medicine at this University by fulfilling all the requirements for undergraduates, completing in full the final year's work in this college, and passing satisfactory examinations.

Theses.—Every candidate for the degree of doctor of medicine in this college is required to prepare a thesis on some laboratory or clinical subject, done in this college. This thesis must embody the results of original research made by the student himself, and be creditable from a literary as well as from a technical point of view.

A thesis will be required of those who have completed their third-year work in medicine, i. e., the class of 1909, and all who have entered subsequently. Great emphasis is laid upon the careful and accurate preparation of the theses. Students are advised to make selection and begin preparation of thesis not later than the beginning of the junior year.

A detailed statement of the rules and regulations governing the prepar-

ation of the theses may be obtained from the chairman of the thesis committee.

THE ROLLIN E. CUTTS PRIZE IN SURGERY

Dr. Mary E. Smith Cutts, '91 Medical, has given the University, as a memorial of her husband, Dr. Rollin E. Cutts, '91 Medical, the sum of \$500, the income from which is to be awarded in the form of a gold medal to that member of the senior class of the College of Medicine and Surgery who presents the best thesis showing original work upon a surgical subject.

Course of Instruction

DEPARTMENT OF ANATOMY

THOMAS G. LEE, B. S.,
Professor of Histology and Embryology

JOHN BLACK JOHNSTON, Ph. D.,
Associate Professor in Comparative Neurology

WINFIELD S. NICKERSON, Sc.D., M.D.,
Assistant Professor of Histology and Embryology

JARL FERDINAND LEMSTROM, M.D.,
Assistant in Micro-Technique

CHARLES E. INGBERT, Ph.D., M.D.,
Associate in Neurology

E. M. WATSON, B.A.,

E. M. WATSON, B.A., *Departmental Laboratory Assistant*

KATE WYMAN, B.A., *Departmental Laboratory Assistant*

CHARLES A. ERDMANN, M.D.,
Professor of Anatomy

ARTHUR W. MEYER, B.S., M.D.,
Assistant Professor of Anatomy

EARLE R. HARE, B.A., M.D.,
Instructor in Anatomy

C. C. TYRELL, B.A., M.D.,
Prosector in Anatomy

E. E. HEMINGWAY, Ph.D.,
Assistant in Anatomy

The department of anatomy is located in two separate buildings, adapted to its work, and equipped with the best modern appliances. The building devoted to gross anatomy includes one large students' dissecting room, the general laboratories of anatomy, a bone laboratory for osteological research work, the offices of the professor and assistants in anatomy, preparation rooms and morgue. An ample supply of dissecting material is provided.

In the first year the subjects of osteology and syndesmology are pursued by means of lectures, laboratory demonstrations and recitations from the specimen.

The bones of a human skeleton are loaned to the student for purposes of study and recitation.

Myology, angiology, splanchnology and neurology are studied in connection with the dissection and laboratory demonstrations of the thoracic, abdominal and pelvic viscera upon the lower animal. This is followed by the dissection of the human body and a comparative brain.

In the second year the alimentary canal, respiratory tract, genito-urinary system, organs of special sense and the cerebro-spinal nervous system are pursued by means of lectures, recitations and laboratory demonstrations. The dissection of the human body is repeated and followed by a series of lectures and demonstrations on descriptive and surgical anatomy. The student dissects in the first semester of the first year, and in the first half of the second semester of the second year, recites upon the subject and observes demonstrations made by a corps of assistants under the direction of the professor of anatomy.

Dissection is supplemented by drawings from dissections made upon outlines of the human skeleton, which are furnished to the student.

In the third year the student takes up the study of the human body from a topographical and surgical standpoint and is given a thorough review of the surgical regions, emphasizing the practical points in relation to their clinical application.

The work in microscopic anatomy, histology, embryology, neurology and micro-technique occupies all four floors of the entire north wing and center of the Medical Science Building, amounting to about 17,000 square feet. The main laboratory on the first floor measures 44x72 feet, lighted by windows on three sides and a part of the fourth. Each student is provided with a sink, gas, electric light, copper heating table, microscope locker and microscope, and a locker for the storage of apparatus and material. On the other floors there are to be found a lecture room and well-equipped laboratories for courses in neurology, micro-technique, experimental work in histology and embryology, private rooms for investigators, various storage and preparation rooms, and rooms for reconstruction, chemical, photographic and photomicrographic work. These various laboratories and rooms are very well equipped with microscopes, microtomes, thermostats, a great variety of technical glassware, and other apparatus.

The departmental library contains a carefully selected collection of reference literature, both standard and periodical. There has been recently added to the library a large part of the working anatomical library of the late Professor William His of Leipzig, amounting to about 8,500 titles by 2,500 authors. In addition to this collection the other libraries of the University, together with the public libraries of Minneapolis and

St. Paul, give the students access to practically all of the important literature relating to the work of this department.

The courses are made as practical as possible, the student making a large number of permanent preparations for his own use. In addition each student is loaned a number of complete embryological series of mammalian and other vertebrate embryos cut in different planes and illustrative of different stages of development.

The lecture courses are illustrated by charts and lantern slides made from histological and embryological specimens. Demonstrations are given under the projection or compound microscope of typical sections of tissues and organs accompanied by camera lucida drawings or photomicrographs with explanatory text.

All students are recommended to purchase a microscope at the beginning of the course. This instrument is an indispensable part of the outfit of a well trained physician. Suitable microscopes can be purchased for from \$50 to \$75 which may be fitted with such other parts as may be desired. Students not owning microscopes will be furnished with instruments at a rental fee.

GROSS ANATOMY

1. **HUMAN OSTEOLOGY** PROFESSOR ERDMANN AND DR. HARE
 Six credits (eighteen lectures and recitations per week for six weeks) First quarter
 Required of freshmen.
 Lectures and recitations upon the human skeleton and supplementary work on the osteology of domestic animals. A practical study of the skeleton, followed by recitation from the specimen.
2. **SYNDESMOLOGY** PROFESSOR ERDMANN AND DR. HARE
 Three credits (eighteen lectures and recitations per week for three weeks) First quarter
 Required of freshmen.
 Lectures and recitations upon the articulations, their structure and function.
3. **DISSECTION** ASSISTANT PROFESSOR MEYER, DRs. HARE AND TYRELL
 Seven and one-half credits (twenty-one hours each week for nine weeks) Second quarter
 Required of freshmen. Open to students who have completed course 2.
 The student makes a complete dissection of all the structures of either the upper or lower half of the human body, using text-books, atlases and models as guides. The work is largely independent, and a dissection must be completed in the quarter in which it was undertaken.
4. **DISSECTION** ASSISTANT PROFESSOR MEYER, DRs. HARE AND TYRELL
 Nine credits (twenty-four hours each week for nine weeks) Third quarter
 Required of sophomores.
 In this course the student completes the dissection of the other half of the human body.
5. **TOPOGRAPHICAL AND SURGICAL ANATOMY** PROFESSOR ERDMANN
 One and one-half credit (three hours, lectures and recitations each week for nine weeks) Third quarter
 Required of juniors. Open to students who have completed courses 1, 2, 3 and 4.

A comprehensive review of the relations of structures composing the surgical regions of the human body; demonstrations with dissections, lantern, and upon the living model, showing the anatomical and surgical landmarks, and their applications.

6. **THE LYMPHATIC SYSTEM**

ASSISTANT PROFESSOR MEYER

A comprehensive review of the human lymphatic system including the tonsils, adenoids and hemolymph glands. This course will consist of a series of lectures incorporating the results of recent research, and demonstrations on specially prepared dissections and injections, supplemented by a consideration of the lymphatic system of some of the lower vertebrates.

Students who have completed their dissections are eligible. This and the following course will be given at an hour which is most convenient for those electing it.

7. **THE GENITO-URINARY ORGANS**

ASSISTANT PROFESSOR MEYER

The scope of this course is similar to the above, but students will be expected to do actual laboratory work on gross sections made in various planes, of the cadavers of fetuses near term, of infants, adolescents and adults. An opportunity will also be afforded to study specially prepared dissections and preparations, and the aim will be to consider the human reproductive organs in their broadest relations as well as in their minute anatomical details. The development history will be referred to only as required. This course will be given under the same conditions as the above.

8. **TOPOGRAPHICAL ANATOMY OF CROSS SECTIONS**

PROFESSOR ERDMANN

AND DR. TYRELL

Open to third and fourth year students.

A series of lectures and demonstrations, supplemented by the individual study of frozen and specially prepared cross sections of the human body, and a series of lantern slides representing actual sections.

9. **RESEARCH WORK**

PROFESSOR ERDMANN

The laboratory is equipped for the original investigation of anatomical problems. Students suitably fitted who have the time to do such work are encouraged to undertake it.

10. **ADVANCED PRACTICAL ANATOMY**

PROFESSOR ERDMANN

Opportunity is afforded for advanced work in practical anatomy to suitably trained students and practitioners, at any time during the college year.

HISTOLOGY, EMBRYOLOGY AND NEUROLOGY

1. **GENERAL VERTEBRATE MORPHOLOGY AND HISTOLOGY**

PROFESSOR LEE.

ASSISTANT PROFESSOR NICKERSON

Four and one-half credits (six lectures and recitations, and six hours laboratory work per week)

First quarter

Open to freshmen.

The structure and properties of protoplasm; the cell, its structure; the phenomena of cell division. A comparative study of the histology of the epithelial, connective and muscular tissues, the blood, and the vascular and lymphatic systems of man and vertebrates.

2. **MICROSCOPIC ANATOMY OF MAN AND VERTEBRATES**

PROFESSOR LEE.

ASSISTANT PROFESSOR NICKERSON

Four and one-half credits (six hours lecture and recitation, and six hours laboratory work per week)

Second quarter

Open to freshmen who have completed course 1 or equivalent.

A comparative study of the morphology, microscopic anatomy, origin and development of the various organs of the alimentary, respiratory, and uro-genital systems.

3. **MICRO-TECHNIQUE AND THE MORPHOLOGY OF THE SPECIAL SENSE ORGANS**

PROFESSOR LEE

Four and one-half credits (six hours lecture and recitation and six hours laboratory work per week)

Third quarter

Open to sophomores or those who have completed courses 2 and 12, or equivalent.

A detailed study of the structure of the organs of special sense, together with practical exercises in micro-technique, methods of fixation, embedding, sectioning, staining, reconstruction, etc.

5. **DENTAL HISTOLOGY AND EMBRYOLOGY** ASSISTANT PROFESSOR NICKERSON
Three credits (four lectures, four recitations, eight hours laboratory per week) Fourth quarter
Open to first-year students. A modified course specially arranged and open only to dental students.
The structure and histogenesis of the organs and tissues, the structure and development of the teeth and jaws, the mouth cavity and glands.
7. **CYTOLOGY AND HISTOGENESIS** PROFESSOR LEE
Three credits (lectures and laboratory) Third quarter
Elective course open to students who have had course 3 or 13, or equivalent.
10. **RESEARCH WORK IN HUMAN AND VERTEBRATE MORPHOLOGY** PROFESSOR LEE
Properly qualified students will be provided every facility for original investigation of anatomical problems.
11. **ELEMENTS OF VERTEBRATE EMBRYOLOGY** PROFESSOR LEE, ASSOCIATE PROFESSOR JOHNSTON
Four and one-half credits (six lectures and recitations, and six laboratory hours per week) First quarter
Open to first-year students.
A comparative study of reproduction; the ovum, the spermatozoan, fertilization, cleavage, formation of the blastodermic layers, the formation of the embryo and foetal envelopes, with practical work on mammalian and other vertebrate embryos.
12. **ADVANCED VERTEBRATE EMBRYOLOGY** PROFESSOR LEE, ASSOCIATE PROFESSOR JOHNSTON
Three credits (six lectures and recitations, and six hours laboratory per week) Second quarter
Open to first-year students who have completed course 11 or equivalent.
A comparative study of human and mammalian embryos, including impregnation, segmentation and implantation of the ovum, the formation, structure and relationships of the placenta and the foetal envelope, and the details of organogenesis studied in a practical manner upon a very large collection of serial sections of human and mammalian embryos cut in various planes, and representing all phases of development.
13. **SPECIAL EMBRYOLOGY OF MAN AND VERTEBRATES** PROFESSOR LEE
Four and one-half credits (six lectures and recitations, and six hours laboratory per week) Third quarter
Open to second-year students who have completed courses 2 and 12.
A study of assigned problems including the elements of teratology.
17. **EXPERIMENTAL EMBRYOLOGY**
Three credits (lectures and laboratory) Fourth quarter
Special course for advanced students.
20. **THE ANIMAL PARASITES OF MAN** ASSISTANT PROFESSOR NICKERSON
Three credits (six hours per week lectures and laboratory) Third quarter
An elective course in Medical Zoology. The general outlines of the morphology and classification of the different groups which contain members parasitic upon man, with special consideration of each species of medical importance, including its distribution, life history, methods of infection, means of diagnosis, and the chief symptoms produced by it.

21. **ELEMENTS OF MAMMALIAN NEUROLOGY** **ASSOCIATE PROFESSOR JOHNSTON AND DR. INGBERT**
 Three credits (six lectures and recitations, and six hours laboratory per week) **Second quarter**
 Open to first-year students who have completed courses 1 and 11, or equivalent.
 A study of the structure and relations of the nerve elements and of the general morphology of the central nervous system.
22. **THE HUMAN NERVOUS SYSTEM** **ASSOCIATE PROFESSOR JOHNSTON AND DR. INGBERT**
 Four and one-half credits (six lectures and recitations, and six hours laboratory) **First quarter**
 Open to second-year students who have completed courses 11, 12 and 21, or equivalent.
 A detailed study of the internal structure and functional organization of the central nervous system by means of sections of the human brain, with comparison of mammals and lower vertebrates.
23. **SPECIAL AND APPLIED NEUROLOGY** **ASSOCIATE PROFESSOR JOHNSTON AND DR. INGBERT**
 One and one-half credits (two lectures and recitations, and two hours demonstrations per week) **Fourth quarter**
 Open to third year students.
 Special studies in preparation for the work of the fourth year in pathology and diseases of the nervous system.
24. **NEUROLOGICAL TECHNIQUE** **ASSOCIATE PROFESSOR JOHNSTON**
 Three credits **Fourth quarter**
 Elective course for qualified students.
 Practical work in the preparation of the nervous system for gross and microscopic study.
26. **THE NERVOUS SYSTEM AND MENTAL LIFE** **ASSOCIATE PROFESSOR JOHNSTON**
 Two credits (two lectures, two demonstrations and reading with reports and discussions per week) **Second quarter**
 Open to a limited number of students by special permission.
 The course will include an analysis of nervous mechanisms on the basis of function, followed by a study of the mechanisms of correlation, the growth and education of the nervous system, cerebral functions and localization, and the neural basis of elementary phenomena of consciousness.
27. **COMPARATIVE NEUROLOGY OF VERTEBRATES** **ASSOCIATE PROFESSOR JOHNSTON**
 Six credits (six hours lecture and recitations, and four hours laboratory per week) **Second quarter**
 Intended for graduates; open by special permission to seniors who meet the requirements. Prerequisite courses 1 and 2, or 3 in Animal Biology, or courses 2 and 12 in Histology and Embryology.
30. **RESEARCH IN NEUROLOGY** **ASSOCIATE PROFESSOR JOHNSTON**
 Open only to those who are qualified to carry on investigation.
 Problems and special work in vertebrate neurology.
40. **ANATOMICAL JOURNAL CLUB AND SEMINAR**
 Weekly meetings during year for reviews of the current literature and discussion of special topics in anatomy, histology, embryology, and neurology, and of the research work being carried on in the department. The department library, which is large and rapidly growing, receives all the leading anatomical journals.

The following text-books should be consulted:

Anatomy. Cunningham, Piersol, Morris, Gray, Spalteholz Atlas, Barker's Laboratory Manual, Cunningham's Manual of Dissection, Treve's Applied Anatomy, Barker's Anatomy of the Nervous System.
Collateral Readings. Quain's Anatomy, Flower's Osteology of Mammals, Gegenbauer's Elements of Comparative Anatomy, Chauveau's Comparative Anatomy, Wiedersheim's Elements of Comparative Anatomy, McClellan's

Regional Anatomy, Deaver's Surgical Anatomy, Edinger's Anatomy of the Nervous System, Hildebrans's Chirurgisch Topographische Anatomie, Schultze's Applied Anatomy, Elsendrath Clinical Anatomy, Box and Eccles' Applied Clinical Anatomy.

Histology. Wilson's The Cell; Bohm-Davidoff-Huber's Histology; Stöhr-Lewis' Histology; Bailey's Histology; Piersol's Histology; Ferguson's Histology; Szymonowicz-MacCullum's Histology; Sobotta-Huber's Atlas; Klein's Histology; Mann's Histology; Lee's Vade Mecum; Kolliker's Gewebelehre; Oppel's Mikroskopischen Anatomie; Duval's Histologie; Ranvier's Histologie.

Embryology. Minot's Human Embryology; Minot's Laboratory text books; Hertwig-Mark's Embryology; McMurrich's Embryology; Heisler's Embryology; Marshall's Embryology; Kolliker's Embryologie; Schultze's Embryologie; Kollman's Embryologie; Schenk's Embryologie; Reese's Embryology.

Neurology. Johnston's Nervous System of the Vertebrates; Barker's Nervous System; Edinger's Lectures Nervous System; Gordinier's Nervous System; Van Gehuchten's Systeme Nerveaux; Kolliker's Gewebelehre; Obersteiner; Sabin's Atlas.

DEPARTMENT OF CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., *Professor of Chemistry*

CHAS. F. SIDENER, B.S., *Professor of Chemistry*

EDWARD E. NICHOLSON, M.A., *Assistant Professor of Chemistry*

EVERHART P. HARDING, M.S., Ph.D., *Assistant Professor of Chemistry*

IRA HARRIS DERBY, B.S., *Assistant Professor of Chemistry*

LILLIAN COHEN, M.S., *Instructor in Chemistry*

FRANCIS C. FRARY, M.S., *Instructor in Chemistry*

JOHN A. HANDY, Ph.C., *Instructor in Chemistry*

JAMES ZIMMERMAN, B.A., *Instructor in Chemistry*

WALTER L. BADGER, B.A., *Instructor in Chemistry*

CHEMISTRY

1. **GENERAL CHEMISTRY** MISS COHEN AND MR. BADGER
 Six credits (six hours per week) Both semesters
 Open to all who do not present any entrance credits in chemistry; but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; the laboratory fee is five dollars per semester.
 Recitations and laboratory work; the course includes a study of the common elements and their compounds, with an introduction to the modern theories of chemistry.
2. **ADVANCED GENERAL CHEMISTRY** PROFESSOR FRANKFORTER
 Six credits (six hours per week) Both semesters
 Open to all who have completed a satisfactory course in general chemistry; both semesters must be completed before credit is given for the first semester; the laboratory fee is five dollars per semester.
 Lectures and laboratory work; the ground covered includes an introduction to physical and technological chemistry, with an exhaustive study of the chemical elements.
3. **QUALITATIVE ANALYSIS** PROFESSOR NICHOLSON AND MR. FRARY
 Six credits (six hours per week) Both semesters
 Open to those who have completed course 2; the laboratory fee is five dollars per semester.
 Lectures and laboratory work, with recitations and collateral reading. The course includes the general reactions of the metals and the acids, with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.

6. ORGANIC CHEMISTRY

PROFESSOR FRANKFORTER

Six credits (six hours per week)

Second semester

Open to those who have completed course 3; the laboratory fee is ten dollars.

Lectures and laboratory work. The course includes an exhaustive study of the theories of organic chemistry, with one or more important preparations in each of the advanced series and groups of compounds.

7. TOXICOLOGY AND HYGIENE

PROFESSOR FRANKFORTER, ASSISTANT

PROFESSORS HARDING AND DERBY

Second semester

Open to first-year students.

Toxicology.—This course includes the general methods for the separation and identification of the poisons both organic and inorganic. Attention will be given to the identification of poisons associated with medicines and with vegetable and animal matter. Besides this qualitative and quantitative work, attention is given to the structure of those organic groups of compounds which have poisonous properties.*Hygiene.*—Chemistry lectures and laboratory work. This course includes the chemical analysis of air, water, and some of the common foods, milk, sugar and fruit products. Special attention is given to food adulteration and to food preservations.

For work in other special or technical lines of chemistry, numerous courses are offered (see Bulletin of the School of Chemistry). Facilities for research work are also afforded in a large number of lines.

The analysis of the urine is dealt with under physiological chemistry in the department of physiology, in the pathology of the urinary system in the department of pathology, and in the clinical laboratories in connection with the microscopy of the urine.

DEPARTMENT OF PHYSIOLOGY

RICHARD O. BEARD, M.D., *Professor of Physiology*M. R. WILCOX, M.D., *Assistant Professor of Physiology*F. H. SCOTT, M.A., M.D., Ph.D., *Assistant Professor of Physiology*JULIUS PARKER SEDGWICK, B.S., M.D., *Instructor in Physiological Chemistry*GEORGE D. HAGGARD, M.D., *Instructor in Physiology*

COURSES OF INSTRUCTION

The department of physiology occupies rooms in the medical science building, including a laboratory of experimental physiology, a laboratory of physiological chemistry, demonstration and recitation rooms, the laboratory library and the office of the chief of the department. A large amphitheatre adapted to the demonstration of major experiments adjoins the laboratories and is used by the department for lecture purposes.

In the basement of the medical science building is a well-equipped workshop for the manufacture and repair of apparatus. Here, also, are animal rooms, furnished with enclosures, breeding cages, frog-tanks and aquarium. From the animal room supplies of animals and materials are obtained for the work in physiological chemistry and experimental physiology. The hygienic conditions of the room are carefully studied, with a view to maintaining the physiological and structural integrity of its animal occupants as perfectly as possible.

The physiological laboratories are equipped with a full supply of apparatus, instruments, etc., for experimental purposes, including artificial respiratory machines, batteries, Du Bois Reymond coils, galvanometers, rheostats, Despretz signals, chronographs, moist muscle-chambers, kymographions, spring myographs, stethoscopes, phonendoscopes, stethometers, sphygmographs, cardlographs, sphygmometers, Gaskell's clamps, oncometers, onco-graphs, hemometers, hemocytometers, hematocrits, ergograph, plethysmograph, and microscopes. Electric motor power is provided for driving apparatus.

The course in physiology is graded in the first and second years. Under the concentration system in vogue, something more than one-half of the student's time is occupied with this study during one semester of each of these years.

Each phase of the subject is treated as a unit: i. e., the laboratory courses in physiological chemistry, experimental physiology, physical chemistry, etc., are correlated and interwoven with the lecture courses throughout. The work is essentially practical and is individualized as much as possible.

In the first year, the student takes up the study, first, of the physiologic components of the animal body; next, the physiological and physical properties of tissue-cells in general; the nutritive media; and the neuromuscular mechanisms. He then enters upon the study of systematic physiology, taking, in turn, the circulation, digestion, secretion, respiration and excretion. Urinalysis is made a special feature of the work in physiological chemistry. The student is thoroughly drilled in the technique of analytical and estimative methods in the study of the body-fluids.

In the second year, the same methods are applied to the problems of metabolism and nutrition. The student makes a complete nutritive balance, based upon a series of actual feeding experiments, including the analysis of a standard dietary, the qualitative and quantitative examination of the feces and urine, the estimation of the total and differential nitrogens and the determination of respiratory quotients.

In relation to the question of nutrition the distinctive physiologic conditions of successive ages of human life are discussed.

The last three-quarters of the year are occupied with the discussion and laboratory study of the physiology of the nervous system, special attention being paid to the observation and testing of special sense phenomena, cerebral localization, etc.

A laboratory reference library is accessible to the students for purposes of collateral reading.

COURSES OF STUDY (See p. 31)

FIRST YEAR

1. **GENERAL CELLULAR PHYSIOLOGY** PROFESSORS BEARD AND WILCOX, AND DR. SEDGWICK
 Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) First quarter
 The study of the physiologic components of the animal body; the physiologic and physical properties of the tissue-cells in general; the specializations of function; the nutritive media, including methods of blood examination.
2. **THE MUSCULO-NERVOUS MECHANISMS** PROFESSORS BEARD AND WILCOX
 Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) First quarter
 The study of the phenomena of muscle and nerve action, including the principles of nerve control in general. The student is introduced in this course to the technique of experimental study.
3. **SYSTEMIC PHYSIOLOGY** PROFESSORS BEARD AND WILCOX AND DR. SEDGWICK
 Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Second quarter
 The vascular mechanism, including the estimation of blood-pressure, the mapping of cardiac areas, the study of heart sounds, and the making of sphygmograms.
 The digestive system, including the process of secretion, the analysis of the digestive fluids, the examination of the normal stomach contents and the conduct of digestions.
4. **SYSTEMIC PHYSIOLOGY (Continued)** PROFESSORS BEARD AND WILCOX AND DR. SEDGWICK
 Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Second quarter
 The respiratory mechanism; the mechanics, physics, chemistry and nerve control of respiration.
 The excretory system, including the study of excretion by the air-passages, the intestinal tract, the skin and the kid-

ney. Analysis of the physiological urine is addressed both to the determination of functional facts and to the attainment of the technique of clinical diagnosis in this field.

SECOND YEAR

5. **METABOLISM AND NUTRITION** PROFESSOR BEARD AND DR. SEDGWICK
 Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Third quarter
 A study of metabolic and nutritional problems for the determination of nutritive balance, nitrogenous and body equilibrium, and specific dietetic results; including the analysis of standard dietaries and the further examination of the normal stomach contents and the faecal debris, the estimation of nitrogen excretion in total and in differential forms, the relation of fat splitting and fat-absorption, and the determination of respiratory quotients, etc.
 A study, also, of the distinctive physiologic features of foetal and infantile life, of childhood, puberty, pregnancy, parturition, the climacteric and old age.
6. **PHENOMENA OF STIMULATION** PROFESSORS BEARD AND WILCOX
 Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Third quarter
 A study of the conditions of stimulation, the nature of stimuli and their effects upon the nervous mechanism, including the phenomena of absence, section, and the reactions of degeneration.
7. **PHYSIOLOGY OF SPECIAL SENSE ORGANS** PROFESSORS BEARD AND WILCOX
 Four and one-half credits (twelve lecture and recitation periods, six laboratory periods) Fourth quarter
 A study of special sense phenomena and of the means of determining the acuity of, and the influences which condition, special sense function in all its fields.
8. **THE PHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM** PROFESSORS BEARD AND WILCOX
 Four and one-half credits (twelve lecture and recitation periods, and six laboratory periods) Fourth quarter
 A study of the functions of the nervous system in general, including the functional relations of nerve tracts, association paths, and central localization.

Text-Books:

First and second years—

The American Text-book of Physiology.

Howell's Text-book of Physiology.

Foster's Physiology, Sixth English edition.

Hammarstein's Physiologic Chemistry.

Collateral Reading—Landois and Sterling's Handbook of Physiology; Van Noorden's Text-book of Metabolism; Stewart's Practical Physiology; Tigerstedt's Physiology; Blyth's Foods and their Composition; Hutchinson's Dietetics.

DEPARTMENT OF PHARMACOLOGY, MATERIA MEDICA,
THERAPEUTICS

E. D. BROWN, Phm.D., M.D., *Acting Professor of Pharmacology and
Materia Medica*

W. H. CONDIT, B.S., M.D., *Instructor in Therapeutics and Materia Medica*

W. D. SHELDON, M.D., *Clinical Instructor in Medicine and Instructor in
Therapeutics*

CHAS. F. DIGHT, M.D., *Instructor in Pharmacology*

....., *Assistant in Pharmacology, and Materia Medica*

The instruction in this department aims to give the student a knowledge of the characters and actions of drugs, and a scientific knowledge of their use in the treatment of disease.

The course comprises lectures, recitations, demonstrations, and experimental laboratory work which is done by the students.

1. **ELEMENTARY PHARMACY, GENERAL TOXICOLOGY AND PRINCIPLES OF
PRESCRIPTION WRITING** PROFESSOR BROWN
Three credits (three hours lecture or recitation per week)
First semester, second year

Required of sophomores.

The course includes the following subdivisions:

- (a) Elementary pharmacy; the gross, microscopic and chemie structure of drugs; weights and measures; pharmaceutic processes; and classes of pharmaceutic preparations.
- (b) General treatment of poisoning; principles of prescription writing and incompatibilities; principles and rules of incompatibility; rules for solubility; construction of prescriptions; grammar and phrases of prescription-Latin, with class practice in writing simple prescriptions; use and materia medica of flavors.
- (c) Materia medica is studied from the crude drugs and pharmaceutic preparations taken from the museum of materia medica to which the student has access at all times.

2. **GENERAL PHARMACODYNAMICS (Experimental)** PROFESSOR BROWN
Four and one-half credits (nine hours laboratory work per week)
First semester

Required of sophomores.

Experiments on cold-blooded and warm-blooded animals, illustrating the action of drugs and the methods of pharmacologic experimentation. The class is divided into sections and these sections into groups of three to six students, each group performing experiments in the same line, but by modified methods or different drugs having a similar pharmacologic action. The results are discussed at conferences, and the conclusions arrived at from the sum of the results. The knowledge thus obtained is by direct observation and serves to impress the student with the actions of drugs, and prepares him for the systematic didactic courses given in the third year.

The experimental course includes the following subdivisions:

- (a) Actions of drugs on tissues outside the body, corrosives, hemoglobin, osmosis, etc.
- (b) Exercises on intact mammals, absorption and excretion of drugs; racial idiosyncrasy; treatment of poisoning; emetics; convulsants and depressants; pulse; pupils; salivation, etc.
- (c) Exercises on frogs, convulsants, central depressants, local anesthetics, striped and cardiac muscle, cardiac nerves, etc.
- (d) Operative work on mammals, general anesthetics, the effects of important drugs on blood pressure, respiration, oncometric and myocardiographic work, diuresis, peristalsis, perfusion of excised organs, isolated heart, etc.

3. **SYSTEMATIC PHARMACOLOGY, TOXICOLOGY, MATERIA MEDICA AND THERAPEUTICS** **PROFESSOR BROWN**
 Three credits (two hours lecture and recitation per week)
First, second and third quarters
 Required of all juniors.

This course is the principal didactic course given in the department. The instruction is given by lectures and recitations. Each drug or group of drugs is studied in detail under the following subdivisions:

- (a) *Pharmacodynamics*. The effects of drugs are studied from the experimental and clinical evidence. Constant reference is made to the results obtained in the experimental course (course 2).
- (b) *Toxicology*. Symptoms and treatment of poisoning.
- (c) *Materia Medica*. The student is required to be able to identify the more important drugs, learn their physical characters, doses, etc.
- (d) *Therapeutics*. The conditions in which the drugs are rationally indicated or in which their empirical use has been found of value.

4. **PRESCRIPTION WRITING**
 One credit (two hours lecture and recitations per week)
Fourth quarter
 Required of all juniors.

Hypothetical cases are given and the student is required to write a prescription for the treatment, using the proper drugs which have already been covered in the text.

Text-Books: Pharmacology, Sollmann.

5. **CLINICAL THERAPEUTICS** **DRS. SHELDON AND CONDIT**
 Two credits (one hour weekly)
First and second semesters
 Required of all seniors.
 Bedside work in hospital and dispensary will be conducted having in view the therapy of cases which are under the special care of and study by the department of medicine.

6. **THERAPEUTIC CONFERENCES** **DRS. CONDIT AND SHELDON**
 Two credits (one hour weekly)
First and second semesters
 Required of all seniors.
 Conferences on assigned topics to be prepared by students from the point of view of literature and current clinic records, will be conducted weekly. These will include the therapy of some of the common diseases and also the varied application of some of the common drugs and methods.

7. **PRACTICAL PHARMACY** **PROFESSOR WULLING**
 One credit (four laboratory and lecture hours per week)
Third quarter
 Required of all juniors.

- 1. U. S. Pharmacopoeia.
 - 1. Metrology.
 - 2. Grades of drugs in use.
 - 3. Pharmacopoeial requirements as to purity.
- 2. Identity and impurities with U. S. Pharmacopoeial tests of six official substances.
- 3. Dispensing.
 - 1. The prescription.
 - 2. Compounding of prescriptions calling for the preparation of fourteen types of pharmacopoeial preparations.

Text-Books:

Pharmacology, Materia Medica and Therapeutics—Sollmann.

Collateral Reading—U. S. Pharmacopoeia; Dosebook and Manual of Prescription Writing—Thornton; National Dispensatory; National Formulary.

DEPARTMENT OF PATHOLOGY AND BACTERIOLOGY

FRANK F. WESBROOK, M.A., M.D., C.M., *Professor of Pathology and Bacteriology*

S. MARX WHITE, B.S., M.D., *Associate Professor of Pathology and Bacteriology*

H. W. HILL, M.D., *Assistant Professor of Bacteriology*

LOUIS B. WILSON, M.D., *Assistant Professor of Clinical Pathology*

J. FRANK CORBETT, B.S., M.D., *Assistant Professor of Surgical Pathology*

R. H. MULLIN, B.A., M.D., *Senior Demonstrator in Pathology and Bacteriology*

H. E. ROBERTSON, A.B., M.D., *Demonstrator in Pathology*

CHELSEA C. PRATT, M.D., *Junior Demonstrator in Pathology and Bacteriology*

J. L. ROTHROCK, A.M., M.D., *Clinical Instructor in Pathology*

ARTHUR S. HAMILTON, B.S., M.D., *Instructor in Pathology of the Nervous System*

Hospital Laboratory Assistants: Carl O. Estrem, B.A., M.D., and Tolbert Watson, A.B.

Departmental Laboratory Assistant: Lee Pollock.

The Institute of Public Health and Pathology, to which attention has already been directed, provides adequate room and facilities for teaching and research in pathology, bacteriology and public health.

The main laboratory, 56x75 feet, lighted on three sides and by a skylight, is used for the general or required courses. It is divided into twelve loges, each fully and independently equipped in every detail for the use of six students, who are responsible for all equipment therein contained. Supplies are distributed from a supply room opening off the main laboratory. Books and specimens required in teaching are easily procurable from the museum library, which is connected by a special or private passageway with the main laboratory. A combined lecture and autopsy room opens both from the main laboratory and from the hall so that autopsies, lantern demonstrations or lectures may be given during the period devoted to the laboratory exercises without interference with the practical work.

A smaller laboratory, one-half the size of the main laboratory, is provided for special work in graduate and optional courses in the diagnosis of tumors, pathology of the nervous system, practical public health, etc. The same loge arrangement obtains as in the main laboratory.

The hospitals of Minneapolis, St. Paul, Duluth, Rochester and St. Peter, in which members of the staff are working, afford a large supply of material and frequent opportunities for post-mortem examinations. From many institutions and physicians throughout the state, valuable and interesting gross and microscopic materials are received from time to time and are made available in the museum and for macroscopic and microscopic class use.

The State Board of Health laboratories for research and routine investigation are located in the institute as well as a Pasteur Institute for the study and treatment of rabies. This affords an abundance of illustrative material for public health, pathology and bacteriology.

A full equipment of microscopes permits of the rental of an instrument to each student, if he is not provided with one suitable for his purpose.

METHODS OF INSTRUCTION

In this department the center around which all instruction is grouped is constituted by the student's own personal practical experience in the laboratories. This is supplemented and coordinated by lectures, laboratory and lantern demonstrations and recitations as required.

1. GENERAL BACTERIOLOGY

PROFESSOR WESBROOK, ASSISTANT
PROFESSOR HILL, DR. MULLIN AND DR. PRATT

(Twelve lecture and recitation hours and twelve laboratory
hours per week)

Fourth quarter

Required of sophomores.

Lectures and demonstrations. The general scope of bacteriology, the history of its development and the biological and chemical problems involved in the life history of bacteria are dealt with. The classification of the various bacterial forms, the methods of isolation and culture and the composition and manufacture of culture media are studied until a thorough knowledge of technique is acquired. General and special study of the various antiseptics, disinfectants and bactericidal substances and conditions will be undertaken.

Laboratory work, involving the making of their own culture media by the students, the study of bacteria in cultures and under the microscope, technique of staining and other methods, including observations of chemical and biological peculiarities, is thoroughly carried out. Testing of various germicides, chemical and physical, and the use of bacteriological methods in the examination of drinking water form an important part of the work. Bacterial activities concerned in sewage purification, etc., receive attention.

2. GENERAL PATHOLOGY

PROFESSOR WESBROOK, DR. MULLIN, ASSOCIATE

PROFESSOR WHITE, DR. ROBERTSON, DR. PRATT

Nine credits (twelve lecture and recitation hours, and twelve
laboratory hours per week)

Fourth quarter

Required of sophomores.

Lectures, demonstrations and laboratory work on the general processes involved in disease, which includes

- (a) Inflammation. The cell reaction to various irritants is carefully studied throughout a variety of tissues and animals so as to be comparative. As soon as familiarity with cell reaction is insured, the inflammatory processes in the various organs and systems are studied.
- (b) Regeneration not already dealt with under inflammation is illustrated by specimens especially prepared from experimental animals and clinical and autopsy material.
- (c) Inflammatory reactions and pathological processes dependent upon the activities of the circulatory system, including metastasis, thrombosis, embolism, infarction, etc., are systematically studied.
- (d) Degeneration. The theories as to causation and the chemical processes involved are presented on the basis afforded by experimental work, together with a large amount of illustrative clinical material.
- (e) The general physical, chemical and biological processes involved in immunity are presented together with practical and illustrative work on precipitins, agglutinins, opsonins, etc. The pathology of fever is also fully given.
- (f) The theories of causation, the general principles involved and classification of tumors are illustrated by a carefully selected assortment of the various types.

3. PATHOLOGY OF SPECIAL DISEASES (includes Bacteriology)

PROFESSOR WESBROOK, ASSOCIATE

PROFESSOR WHITE, DR. MULLIN, DR. ROBERTSON AND DR. PRATT

Ten credits (four lecture or recitation hours and twelve laboratory hours per week, eighteen weeks)

First semester

Required of juniors.

Disease processes will be grouped, so far as practicable, according to their etiology. Instruction will be afforded by means of lectures, demonstrations of museum specimens and preparations, and laboratory work on materials secured from clinical cases and at autopsy.

The course will consist of instruction in

1. Pathology of infectious diseases.

- (a) Special bacteriology of the infectious diseases with the cultivation on the various media of all the important patho-

genic bacteria, sown and kept under observation by each student. Fluids and tissues from clinical cases and autopsies (human and animal) will be supplied for microscopic and cultural examination and an intimate relationship with clinical pathological work maintained.

- (b) Special pathology of the infectious diseases. Concurrently with the bacteriology and parasitology of each of the diseases, the pathology of each infection will be studied.

The important gross and microscopic lesions in all the organs will be illustrated from clinical and autopsy material, fresh and preserved, and supplemented by experimental work. Each student will be required to prepare and examine under the microscope selected fresh and stained specimens of morbid tissues, fluids, etc.

2. Pathology of toxic and obscure origin. Under this are included the special degenerations, inflammations and other pathological conditions not already included under infectious diseases.

4. **AUTOPSIES AND POST-MORTEM TECHNIQUE** ASSOCIATE PROFESSOR WHITE, DR. ROTHROCK, DR. MULLIN, DR. ROBERTSON AND DR. PRATT

Students will have an opportunity of personally taking part in this work, under the direction of the pathologists in charge, in the hospitals of Minneapolis and St. Paul. A knowledge of the technique of post-mortem work and of morbid anatomy will be thus afforded. Throughout the third and fourth years.

5. **SPECIAL PATHOLOGY OF THE NERVOUS SYSTEM** DR. HAMILTON AND DR. ROBERTSON
Two credits (twelve hours per week, first four weeks) Second semester

Required of juniors.

So far as possible, the clinical history, autopsy notes, gross specimens and sections stained by various special methods will be presented of individual cases representing the principal organic diseases of the nervous system.

6. **PRACTICAL PATHOLOGY OF TUMORS** ASSOCIATE PROFESSOR WHITE AND DR. R. H. MULLIN
(Twelve hours per week, four weeks) Second semester

(Elective for a limited number of students in fourth year.)
Laboratory course on the microscopic study and diagnosis of tumors.

This course includes the comprehensive study of tumors, with the view of giving the student a knowledge of the methods employed in the laboratory diagnosis of this class of pathological conditions and familiarizing him with the characters of the commoner as well as the rarer types, special attention, however, being given to the latter. It is intended to supplement the course on the surgical pathology of tumors by Professor Stewart.

7. **RESEARCH WORK IN ONE OF THE FOLLOWING LINES:** Second semester of third and throughout the fourth year, hours assigned.

- (a) General pathology.
(b) Special pathology and bacteriology and technique.

8. **SURGICAL PATHOLOGY** PROFESSOR STEWART
(Two hours lecture and one hour recitation a week, first semester third year, and two hours per week, second semester, fourth year).

(See Principles of Surgery and Tumors.) This course will consist of lectures and laboratory demonstrations and will cover the general subject of the pathological and bacteriological basis of surgery. The lectures will be illustrated by charts and diagrams, by fresh and preserved specimens, and, so far as practicable, demonstrations will be given of the various processes of the bacteria concerned. Especial attention will be given to inflammation and its complications, to the infectious diseases of surgical importance and to tumors.

PATHOLOGICAL SOCIETY

The medical men of the State who are especially interested and are actually working in pathology and bacteriology formed a society in the autumn of 1901, which meets monthly from October to June, in the laboratories of the department. Papers embodying original work with illustrative specimens are presented at each meeting and once a year the society invites a special guest of honor to give an address in pathology or some allied subject.

Text-books:**Pathology—**

DeLafield and Prudden's Handbook of Pathological Anatomy and Histology.

American Text-Book of Pathology.

Ziegler's General and Special Pathology.

Schmaus-Ewing: Pathology and Pathological Anatomy.

Coplin's Manual of Pathology.

Cattell's Post-Mortem Pathology.

Durck-Hektoen: Special Pathologic Histology.

Jakob: Nervous System.

Mallory and Wright's Pathological Technique.

Collateral Reading—Hamilton's Text-Book of Pathology; Woodhead's Practical Pathology; von Kahlden's Pathological Histology; Thoma's Text-Book of General Pathology; Lubarsch Ostertag, Ergebnisse der Pathologie u. Anatomie; Orth, Pathologische Anatomie; Birch-Hirschfeld, Pathologische Anatomie; Osler's System of Medicine; Clifford Allbutt's System of Medicine; Leukhart's die Thierische Parasiten des Menschen; Bouchard, Traite de Pathologie Generale; Eichorst, Pathologie du Therapie; Gaylord and Aschoff, Pathological Histology; Nothnagel, Encyclopedia of Practical Medicine; Wood, Chemical and Microscopical Diagnosis.

Surgical Pathology—

Bland-Sutton, Tumors, Innocent and Malignant.

Lexer's Handbook of Surgery.

HYGIENE

HENRY MARTYN BRACKEN, M.D., L.R.C.S., (Edin.), *Professor of Preventive Medicine and Secretary of the Minnesota State Board of Health*

F. F. WESBROOK, M.A., M.D., C.M., *Professor of Pathology and Bacteriology and Director of the Minnesota State Board of Health laboratories*

F. H. BASS, *Assistant Professor of Municipal Engineering and Acting Sanitary Engineer, Minnesota State Board of Health*

Open to fourth-year students.

Second semester

The fundamental portions of this subject are covered in the practical and lecture courses on chemistry of water, air, soil, milk and other food, and in the department of physiology in physiological chemistry.

The life histories of bacteria and parasites which act as the causes of communicable diseases are covered in pathology and bacteriology as also the bacteriology of water and milk and courses on germicides and disinfection are given.

The remaining portions of the subject and the application of these principles already inculcated in practical sanitation are given in a special course of lectures and trips of inspection in the fourth year.

The legal phases of sanitation, including federal, state and municipal hygiene, together with the sanitation of various industries and the control of epidemic and communicable diseases are fully dealt with.

The relation of the laboratory and field methods to the location of foci of infection, the practical study of selection and purification of water supplies and the sanitary disposal of sewage and garbage, are thoroughly covered as is also the matter of the sanitary construction of buildings, ventilation and practical school hygiene.

In addition to the lectures and practical work at the college, visits of inspection will be made to abattoirs, sources of water supply, sewage disposal plants, garbage plants, detention hospitals for small pox and other communicable diseases, sanitary camps and sanatoria for tuberculosis, etc.

DEPARTMENT OF MEDICINE

CHARLES L. GREENE, M.D., *Professor of Medicine*

J. W. BELL, M.D., *Emeritus Professor of Physical Diagnosis and Clinical Medicine*

EVERTON J. ABBOTT, A.B., M.D., *Clinical Professor of Medicine*

CHARLES H. HUNTER, A.M., M.D., *Clinical Professor of Medicine*

JAMES T. CHRISTISON, M.D., *Professor of Diseases of Children*

GEORGE D. HEAD, B.S., M.D., *Professor of Clinical Microscopy and Clinical Medicine*

LOUIS A. NIPPERT, M.D., *Clinical Professor of Medicine*

CHARLES NOOTNAGEL, M.D., *Clinical Professor of Medicine and Physical Diagnosis*

THOMAS S. ROBERTS, M.D., *Clinical Professor of Diseases of Children*

GEORGE E. SENKLER, M.D., *Clinical Professor of Medicine*

HENRY L. STAPLES, A.M., M.D., *Clinical Professor of Medicine*

C. H. BRADLEY, M.D., *Clinical Instructor in Medicine*

W. H. CONDIT, B.S., M.D., *Instructor in Therapeutics and Materia Medica*

J. G. CROSS, M.D., *Clinical Instructor in Medicine*

JAMES GILFILLAN, M.D., *Clinical Instructor in Medicine*

P. A. HOFF, M.D., *Clinical Instructor in Medicine*

DAVID LANDO, M.D., *Clinical Instructor in Medicine*

WALTER R. RAMSEY, M.D., *Clinical Instructor in Diseases of Children*

SOREN P. REES, B.S., M.D., *Instructor in Physical Diagnosis and Clinical Medicine*

W. D. SHELDON, M.D., *Clinical Instructor in Medicine and Instructor in Therapeutics*

THOS. W. STUMM, M.D., *Clinical Instructor in Medicine*

HENRY L. ULRICH, M.D., *Instructor in Clinical Microscopy*

ASSISTANTS IN MEDICINE

W. H. AURAND, M.D., *Clinical Assistant in Medicine*

HERMAN A. BOUMAN, M.D., *Clinical Assistant in Medicine*

PAUL B. COOK, M.D., *Clinical Assistant in Medicine*

L. O. DART, M.D., *Clinical Assistant in Diseases of Children*

E. K. GREEN, A.B., M.D., *Clinical Assistant in Medicine*

ALEX. R. HALL, M.D., *Clinical Assistant in Medicine*

JOHN E. HYNES, M.D., *Clinical Assistant in Medicine*

J. P. SEDGWICK, M.D., *Clinical Assistant in Diseases of Children*

CHAS. B. WRIGHT, A.B., M.D., *Clinical Assistant in Diseases of Children*

GENERAL MEDICINE

THIRD YEAR

1. CASE-TAKING AND GENERAL SYMPTOMATOLOGY PROFESSOR GREENE
 (Three hours a week) First quarter
 (a) Lectures and recitations (three hours a week) Second quarter
 (b) Practical clinical exercises at University clinical building
 and St. Paul Free Dispensary.
2. PHYSICAL DIAGNOSIS PROFESSORS GREENE, NOOTNAGEL AND SENKLER
 (Three hours a week) Second quarter
 (a) Lectures and recitations.
 (b) Clinical exercises throughout the junior year at the hospitals and dispensaries of Minneapolis and St. Paul.
 This course includes:
 (a) The thorax, its topography and the methods of examination applied to both the normal and abnormal chest.
 (b) The cardiac region, its topography and methods of examination.
 (c) The lungs and pleura in health and disease.
 (d) The abdominal organs including both general and special methods of examination, i. e., examination of stomach contents, practical urinary examination, etc.
 In this course especial attention is given to the study of the normal as well as the abnormal chest and abdomen, and, wherever possible, opportunity is given the student to examine cases personally and watch their progress and termination.
3. PROFESSOR GREENE
 (Three hours a week) Second semester
 (a) Systematic lectures, case analyses and quizzes on the diseases of the heart and blood vessels.
 (b) Diseases of the lung and pleura.
 (c) Diseases of the kidney.
 (d) Practical clinical exercises in the form of clinical lectures and work in small sections in the wards of the various hospitals and St. Paul Free Dispensary, twice weekly, and in the University Dispensary daily throughout the whole semester.
4. ACUTE INFECTIOUS DISEASES
 Work in small sections in the city hospitals of Minneapolis and St. Paul, twice weekly (in St. Paul after January 1st).

FOURTH YEAR

5. SYSTEMATIC LECTURES, CASE ANALYSIS AND RECITATIONS PROFESSOR GREENE
 This course covers the acute infectious diseases.
 In this connection special attention is given to the so-called tropical diseases, at the present day important because of our territorial extension.
6. CLINICAL EXERCISES AT THE CITY HOSPITALS OF THE TWIN CITIES
 Correlated with the instruction given in course 5. Minneapolis City Hospital throughout the year. St. Paul City Hospital after January 1st, each year.
7. PROFESSOR GREENE
 (a) Diseases of the blood and ductless glands. Systematic lectures, case analyses and recitations, fourth quarter, twice weekly.

The College of Medicine and Surgery

- (b) Special instruction in sections at the hospitals and dispensaries, correlated with the course as given above.

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PROFESSOR GR

Systematic lectures and recitations twice weekly.

- (a) Diseases of the stomach, liver and intestines.
(b) Special clinical work in sections correlated with course given above.

The clinical courses 1 b, 2 b, 3 b, 4, 6, 7 b, and 8 b, are given for most part to small sections of the junior and senior classes in the wards and amphitheatres of the several hospitals and dispensaries of Minneapolis and St. Paul, as follows:

- (a) City Hospital, Minneapolis, two hours a week, both years. Professors J. W. Bell, H. L. Staples and C. Nootnagel, Dr. L. A. Nippert and Dr. S. P. Rees. One hour a week, senior year. Dr. Geo. D. Head and Dr. S. Marx White, Dr. J. G. Cross and Dr. W. D. Sheldon.
(b) St. Barnabas Hospital, Minneapolis, two hours a week, both years. Professor C. H. Hunter.
(c) City and County Hospital, St. Paul, two hours a week both years. Professor E. J. Abbott.
(d) City and County Hospital, St. Paul, two hours a week, both years. Professor C. L. Greene and Dr. Senkler.
(e) Free Dispensary at St. Paul, two hours a week, both years. Professor C. L. Greene and Drs. Ramsey and Hoff.
(f) University Clinical Building, Minneapolis, four hours a week, both years. Dr. L. A. Nippert, Dr. Geo. D. Head.

9. GENERAL CLINICAL COURSE

In addition to the courses above named, clinical lectures are given twice weekly to both junior and senior classes. At each are shown cases of unusual interest and importance. The section work throughout the two years is exceptionally valuable by reason of the small size of the sections, every effort being made to bring the student closely in touch with the teacher and patient.

10. CASE ANALYSIS PROFESSOR GREENE AND CLINICAL INSTRUCTOR

Throughout both the junior and senior years special attention is given to the analysis of actual cases illustrating those portions of the courses that have been dealt with in the lecture room or in the clinical lectures, students being in this way compelled to apply practically such knowledge as they have gained and not only make a diagnosis but go thoroughly into the analysis and bearing of general symptomatology. The older method of simply quizzing in connection with lecture work has been abandoned so far as possible. Exercises throughout the year.

Text and Reference Books—Practice of Medicine: Osler's Practice; Tyson's Practice; Thompson's Practical Medicine; Anderson's Practice. Physical Diagnosis and Clinical Methods: Greene's Medical Diagnosis; Butler's Diagnosis; Sahli's Diagnostic Methods; Cabot's Diagnosis; Musser's Diagnosis; Hare's Diagnosis; Bramwell's Practical Medicine; Cabot's Medical Cases; Hutchinson and Rainey's Clinical Methods. **Collateral Reading:** Cabot on the Blood; Du Costa on the Blood; Hemmeter's Diseases of the Stomach; Bons' Diseases of the Stomach; Allbutt's System of Medicine; American Text Book of Medicine; Gibson's Practice; Gibson on Diseases of the Heart and Aorta; Babcock on Diseases of the Heart; Ebstein and Schwalbe, Handbuch der Praktischen Medizin.

DISEASES OF CHILDREN

1.

PROFESSOR J. T. CHRIS
Second sem

(Two lectures a week)

Open to third-year students.

Lectures arranged to cover so far as possible the general subject of **pediatrics**. This course begins with a consideration of the special characteristics of the normal infant and child, as distinguished

from the adult, and passing on to a detailed description of the features and management of the diseases peculiar to infancy and childhood and of the more or less specialized forms in which certain diseases common to all ages exist during the early years of life. These lectures will be suitably illustrated by charts, colored plates, specimens, and the occasional use of the stereopticon.

2. **PROFESSOR CHRISTISON, DR. RAMSEY AND DR. COOK**
Clinical Instruction will be given at the St. Paul Free Dispensary and the St. Paul City Hospital four hours weekly throughout the third and fourth years.
3. **PROFESSOR ROBERTS, DR. DART AND DR. WRIGHT**
Clinical instruction will be given at the St. Paul Free contagious wards of the City Hospital, the Children's Home, the University Free Dispensary and other specially designated places at such times as opportunity presents. Third and fourth years.

Text-Books:

Holt's Diseases of Children.
 Rotch's Pediatrics.
 American Text-Book of Diseases of Children.
 Collateral Reading—Osler's Practice of Medicine; Keating's Cyclopedia of Diseases of Children; Corlett's Acute Infectious Exanthemata; Chapin's Theory and Practice of Infant Feeding; Stengel's Nootnagel's Encyclopedia.

CLINICAL MICROSCOPY

1. **PROFESSOR GEORGE DOUGLAS HEAD**
 Two credits (two lecture hours and four laboratory hours per week) Third quarter
 Required of senior students.
 The course includes:
 (a) The urine; a macroscopical study of its colors, and sediments, and the microscopical study of blood, pus, epithelial casts, spermatozoa, etc., in the urine of disease.
 (b) The blood: the counting of red and white cells in the blood, the estimation of hemoglobin, the making of blood smears, and the fixing, staining, mounting and studying of all forms of normal and pathological red and white blood cells. In this course students are given specimens of blood from cases of pernicious anemia, myelogenous leukemia, and lymphatic leukemia, for study.
 (c) Stomach contents; the macroscopical, chemical, and microscopical study of gastric contents in various diseases of the stomach, with special reference to differential diagnosis, by lectures and demonstrations.
 (d) Exudates and transudates in various diseases of the pleura and peritoneum. Nine hours a week during half of the second semester.

Books of Reference:

Simon's Clinical Diagnosis.
 Cabot's Clinical Examination of the Blood.
 Ewing's Clinical Pathology of the Blood.
 Reider's Atlas of Urinary Sediments.
 Sahli's Lehrbuch der Klinischen Untersuchungs Methoden.
 Ogden's Clinical Examination of the Urine.
 Boston's Clinical Diagnosis.
 Wood's Chemical and Microscopical Diagnosis.
 Emmerson's Clinical Diagnosis.

The senior class is divided into sections of four each and assigned to the laboratory of clinical microscopy four days of the week throughout the college year. In this work the students are required to make urine, sputum, and stomach contents examinations of the cases coming to the free dispensary. This instruction is under the charge of Dr. Henry L. Ulrich.

NERVOUS AND MENTAL DISEASES

C. EUGENE RIGGS, A.M., M.D., *Professor of Nervous and Mental Diseases*

WILLIAM A. JONES, M.D., *Clinical Professor of Nervous and Mental Diseases*

A. W. DUNNING, M.D., *Clinical Instructor in Nervous and Mental Diseases*

A. S. HAMILTON, B.S., M.D., *Instructor in Pathology of the Nervous System*

H. W. JONES, M.D., *Clinical Instructor in Nervous and Mental Diseases*

CHARLES R. BALL, A.B., M.D., *Clinical Instructor in Nervous and Mental Diseases*

A. E. LOBERG, M.D., *Clinical Assistant in Nervous and Mental Diseases*

COURSES OF INSTRUCTION

The required courses of lectures and recitations in this department will be given in the fourth year. Instruction will be by recitations and the "case method." Elective courses in clinical neurology, psychiatry, medical electricity and neuropathology will be offered in the fourth year.

1. **NEUROLOGY** PROFESSORS RIGGS AND JONES (*alternating*)
(Two hours a week, twelve weeks) First semester
Open to seniors.
Lectures, recitations and demonstrations.

2. **PSYCHIATRY** PROFESSORS RIGGS AND JONES (*Alternating*)
(Two hours a week, five weeks) First and second semesters
Open to seniors.
Lectures, recitations and demonstrations.

3. **ELECTRO-THERAPEUTICS** (*elective*) DR. BALL
Fourth year.

4. **CLINICAL NEUROLOGY AND PSYCHIATRY** PROFESSORS RIGGS AND JONES
Practical instruction will be given upon Thursdays and Saturdays, fourth year. Clinics will be conducted in St. Paul, by Professor Riggs, Drs. Dunning and Ball, at the City and County Hospital, St. Luke's Hospital, St. Joseph's Hospital and the Free Dispensary; and in Minneapolis by Professor Jones, and Drs. H. W. Jones and Loberg, at the City Hospital, Asbury Hospital, St. Mary's Hospital and the University Free Dispensary.

Text-Books:

Oppenheim's Diseases of the Nervous System.
Dana's Nervous Diseases.
Church and Peterson's Nervous and Mental Diseases.
Allan M. Starr's Nervous Diseases, Organic and Functional.
The Eye and Nervous System, Posey and Spiller.
Manual of Psychiatry, Dr. Fursac.
Text-book of Psychiatry, Leonardo Bianchi.
Practical Manual of Insanity, Brower and Bannister.
The Hygiene of Mind, T. S. Clouston.

Collateral Reading:

Edinger's Anatomy of the Central Nervous System; Gordinier's Anatomy of the Central Nervous System.
Gower's Diseases of the Nervous System.

DEPARTMENT OF SURGERY

CHARLES A. WHEATON, M.D., *Emeritus Professor of Surgery*

JAMES E. MOORE, M.D., *Professor of Surgery*

J. CLARK STEWART, B.S., M.D., *Professor of the Principles of Surgery*

FREDERICK A. DUNSMOOR, M.D., *Professor of Operative and Clinical Surgery*

ARTHUR J. GILLETTE, M.D., *Professor of Orthopedic Surgery*

J. FRANK CORBETT, M.D., *Assistant Professor of Surgical Pathology*

ARCHIBALD MACLAREN, A.B., M.D., *Clinical Professor of Surgery*

A. T. MANN, B.S., M.D., *Clinical Professor of Surgery*

HENRY J. O'BRIEN, M.D., *Clinical Professor of Surgery*

JUSTUS OHAGE, M. D., *Clinical Professor of Surgery*

JOHN T. ROGERS, M.D., *Clinical Professor of Surgery*

H. B. SWEITZER, M.D., *Clinical Professor of Surgery*

JNO. B. BRIMHALL, M.D., *Clinical Instructor in Orthopedic Surgery*

A. R. COLVIN, M.D., *Clinical Instructor in Surgery*

WARREN A. DENNIS, M.D., *Clinical Instructor in Surgery*

JUDD GOODRICH, M.D., *Clinical Instructor in Surgery*

ARTHUR A. LAW, M.D., *Instructor in Operative Surgery*

HARRY P. RITCHIE, M.D., *Instructor in Surgery*

VAN H. WILCOX, M.D., *Instructor in Operative Surgery*

R. E. FARR, M.D., *Clinical Instructor in Surgery*

EMIL S. GEIST, M.D., *Clinical Assistant in Orthopaedia*

ARCHA WILCOX, M. D., *Clinical Assistant in Surgery*

COURSES OF INSTRUCTION

The course in surgery is graded in the third and fourth years. Examinations are held at the close of each of these years. Lectures and recitations are given by the teaching staff in surgery and clinics at the dispensaries and hospitals of Minneapolis and St. Paul by a large corps of instructors.

1. THE PRINCIPLES OF SURGERY

PROFESSOR STEWART

Lectures and recitations (two hours a week)

First semester

Open to juniors.

Inflammation; traumatic fevers, suppurations; acute inflammations of joints; ulceration, gangrene; thrombosis and embolism; septicemia; pyemia; erysipelas; tetanus; surgical tuberculosis; actinomycosis, anthrax and glanders.

2. OPERATIVE SURGERY

PROFESSOR DUNSMOOR

(Two hours a week)

Third quarter

Open to juniors.

Lectures upon the principles of operative procedure; the preparation of patient, operator and operating rooms, the principles of asepsis, antiseptics and sterilization; anesthesia and anesthetics; hemostasis, ligatures and sutures; dressings, bandages and the treatment of wounds.

3. THE PRACTICE OF SURGERY

PROFESSOR MOORE

Lectures and recitations (three hours a week)

Second semester

Open to juniors.

Fractures and dislocations; injuries of joints; injuries and surgical diseases of the skin; of the lymphatics, blood vessels and nerves; of the tendons, fasciae and bursae; of the face, mouth tongue, jaws (excepting the study of tumors).

4. **THE PRACTICE OF SURGERY** PROFESSOR MOORE
 (Three hours a week) First semester
 Open to seniors.
 Surgery of the head, neck, chest, back, breast, abdomen, including hernia, anus, rectum and urinary tract. Lectures and recitations.
5. **OPERATIVE SURGERY** PROFESSOR DUNSMOOR AND DR. LAW
 (Six hours a week) First quarter
 Open to seniors.
 An elective laboratory work, consisting of operations, performed by sections of the class under the supervision of the instructors, upon the cadaver and upon animals.
6. **ORTHOPEDIC SURGERY** PROFESSOR GILLETTE
 Lectures and recitations (three hours a week) Fourth quarter
 Open to seniors.
 This includes diseases of bones, joints, synoviae and bursae, congenital and acquired deformities; dystrophies, with the principles of treatment.
7. **TUMORS** PROFESSOR STEWART
 Lectures and recitations (two hours a week) Second semester
 Open to seniors.
 A special course upon tumors, taking up the general pathology and the general principles of the treatment of tumors. Each variety of tumor is then discussed, together with its histology, life-history, diagnosis and treatment. The course is illustrated by charts and museum specimens and lantern slide demonstrations.
8. **BANDAGING AND DRESSING** PROFESSOR DUNSMOOR AND DR. LAW
 (Eight hours)
 Open to seniors.
 A practical course of instruction, by means of demonstrations and drill upon animals and cadaver by the student in person, under the supervision of the chair of operative surgery.
9. **CLINICAL SURGERY**
 Courses of clinics at which operations, in the whole domain of surgery, are witnessed by the students of the third and fourth years. These clinics are held in the dispensaries and hospitals of the cities of Minneapolis and St. Paul, upon Thursdays and Saturdays throughout the year. The classes alternate at the two cities in their attendance upon these clinics. They are conducted personally throughout the year, by the clinical chiefs and their associates as follows:
 At the City and County Hospital, St. Joseph's Hospital, St. Luke's Hospital in St. Paul, weekly, by Professor John T. Rogers.
 At the City and County Hospital, St. Joseph's Hospital, St. Luke's Hospital or Free Dispensary, in St. Paul, with sections of class weekly, by Professor John T. Rogers, Dr. G. M. Coon, Professor A. J. Gillette, Dr. W. A. Dennis, Dr. Judd Goodrich and Dr. A. Colvin.
 At St. Luke's Hospital, Professor Archibald McLaren.
 At St. Joseph's Hospital, Professor H. J. O'Brien.
 At the City and County Hospital, or at St. Joseph's Hospital, or at St. Luke's Hospital, St. Paul, weekly, by Professor Justus Ohage.
 At the Northwestern Hospital, Minneapolis, weekly, by Professor J. E. Moore.
 At the Asbury Hospital, Swedish Hospital or the City Hospital, Minneapolis, weekly, by Professors F. A. Dunsmoor and J. Warren Little.
 At the City Hospital, Minneapolis, weekly, by Professors J. Clark Stewart, J. Warren Little and A. T. Mann.

At St. Mary's Hospital, Minneapolis, by Dr. Farr.

At the University Free Dispensary, by Professor Mann, Drs
Law and Condit.

Text-Books:

Lexer's Handbook of Surgery.

Parks' Surgery.

International Text-Book of Surgery.

Warrens' Surgical Pathology and Therapeutics.

Surgical Diagnosis, Berg.

Bryant's Operative Surgery.

Rinnie's Operative Surgery.

Scudder on Fractures.

Collateral Reading—

Moore's Orthopedic Surgery.

Bradford's and Lovett's Orthopedic Surgery.

Witman's Orthopedic Surgery.

OPHTHALMOLOGY AND OTOTOLOGY

FRANK C. TODD, M.D., *Professor of Ophthalmology and Otology*

E. V. APPLEBY, M.D., *Clinical Instructor in Ophthalmology*

JOHN S. MACNIE, M. D., *Clinical Instructor in Ophthalmology and Otology*

CHAS. N. SPRATT, B.S., M.D., *Clinical Instructor in Ophthalmology and
Otology*

H. JOURNEY WELLS, M.D., *Clinical Assistant in Ophthalmology and Ot-
ology*

FRANK E. BURCH, M.D., *Clinical Assistant in Ophthalmology and Otology*

COURSES OF INSTRUCTION

1. DISEASES OF THE EYE AND ITS APPENDAGES PROFESSOR TODD
(Three hours a week) First quarter
Lectures and recitations.
Refraction and its errors. Illustrated with specimens and stere-
opticon.
2. DISEASES OF THE EAR PROFESSOR TODD
(One hour a week) First quarter
Lectures and recitations.
3. PROFESSOR TODD
Clinical lectures will be given and operations performed at As-
bury or Northwestern Hospital, Minneapolis, every Thursday,
third and fourth year. Clinics will be given at the Minneapolis
City Hospital during December, January, February and March,
third and fourth years.
4. Clinical instruction will be given at the University, and St.
Paul Free Dispensaries in the diagnosis of diseases of the eye
and ear; in the methods of examination; in the use of instru-
ments, including the ophthalmoscope, and in the treatment of
eye and ear diseases, etc. Fourth year.
Diseases of ear, St. Paul, Professor Schadle
Diseases of the eye, St. Paul, Dr. Appleby and Dr. Burch
Diseases of eye and ear, Minneapolis, Dr. Macnie and Dr. Wells
5. OPHTHALMOSCOPY DR. J. S. MACNIE
A practical course of instruction, elective in the senior year.

Text-Books:

May, Diseases of the Eye.

Wood & Woodruff, Common Diseases of the Eye.

Fox's Diseases of the Eye.

Bacon's Diseases of the Ear.

Collateral Reading—DeSchweinitz's Diseases of the Eye; American Text-Book; Norris and Oliver's Ophthalmology; Politzer's Diseases of the Ear; Vassey's Diseases of the Eye; Posey & Wright, Diseases of the Eye, Ear, Nose and Throat.

DISEASES OF THE THROAT AND NOSE

JACOB E. SCHADLE, M.D., *Professor of Rhinology and Laryngology*

WILLIAM R. MURRAY, A.B., M.D., *Clinical Professor of Rhinology and Laryngology*

R. A. CAMPBELL, M.D., *Clinical Instructor in Rhinology and Laryngology*

J. A. WATSON, M.D., *Clinical Instructor in Rhinology and Laryngology*

COURSES OF INSTRUCTION

1. ANATOMY AND PHYSIOLOGY OF THE NOSE AND THROAT

PROFESSOR SCHADLE

Lectures and recitations (two hours a week, eight weeks).

Open to seniors.

Pathology, diagnosis and treatment.

2. CLINICAL INSTRUCTION

PROFESSOR MURRAY AND DR. CAMPBELL

(Five hours a week)

Both semesters

Open to seniors.

Given at the University Free Dispensary, Minneapolis, in the diagnosis and treatment of diseases of the nose and throat; in the methods of examination; in the use of instruments, and in the application of remedies, etc.

3. OPERATIVE CLINICS

PROFESSOR MURRAY

These will be held at Asbury or City Hospital, Minneapolis, every Thursday, third and fourth year.

4. CLINICAL INSTRUCTION

PROFESSOR SCHADLE

(Two hours a week)

Fourth year

Given at the St. Paul Free Dispensary, in the diagnosis of diseases of the nose and throat; in the methods of examination; in the practical use of instruments and application of remedies; and in the applied anatomy of the nose and throat, illustrated by dry and wet preparations.

Text-Books:

Schadle's Outlines of Diseases of Nose and Throat.

Coakley's Diseases of the Nose and Throat.

Grayson's Diseases of the Nose and Throat.

Collateral Reading—Bosworth's Diseases of the Nose and Throat.

Posey and Wright's Diseases of the Ear, Nose and Throat.

Kyle's Diseases of the Nose and Throat.

SKIN, GENITO-URINARY, AND VENEREAL DISEASES

MAX P. VANDER HORCK, M.D., *Professor of the Diseases of the Skin and the Genito-Urinary System*

BURNSIDE FOSTER, M.A., M.D., *Clinical Professor of Diseases of the Skin*

F. R. WRIGHT, M.D., *Clinical Instructor in Dermatology and Genito-Urinary Diseases*

GEORGE M. COON, M.D., *Clinical Instructor in Genito-Urinary Diseases*

JOHN M. ARMSTRONG, M.D., *Clinical Assistant in Genito-Urinary Diseases*

S. W. SWEITZER, M.D., *Clinical Instructor in Dermatology and Genito-Urinary Diseases*

COURSES OF INSTRUCTION

This subject is taught by lectures, recitations and clinical demonstrations.

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|---|---|
| 1. THE ANATOMY AND PHYSIOLOGY OF THE SKIN
(Two hours a week) | PROFESSOR VANDER HORCK
Second semester |
|---|---|

Open to seniors.

Diseases of the skin and its appendages; venereal and genito-urinary diseases.

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|----------------------|--|
| 2. CLINICAL LECTURES | PROFESSORS VANDER HORCK AND FOSTER. |
| (Once a week) | AND DR. WRIGHT
Third and fourth years |

(Once a week)

In connection with the dispensaries and hospitals of Minneapolis and St. Paul.

Text-Books :

Keye's or White and Martin's Diseases of Urinary Organs.

Lydston's Genito-Urinary, Venereal and Sexual Diseases.

Hyde's Diseases of the Skin.

Walker's Dermatology.

Jackson's Diseases of the Skin.

Hyde and Montgomery's Venereal Diseases.

Collateral Reading—Crocker's Diseases of Skin; Morris' Diseases of the Skin; Hayden's Diseases of the Skin; Stelwagon's Diseases of the Skin; Taylor's Genito-Urinary and Venereal Diseases of the Skin.

GYNECOLOGY

ALEXANDER J. STONE, M.D., LL.D., *Professor of Diseases of Women*

AMOS W. ABBOTT, M.D., *Clinical Professor of Diseases of Women*

JOHN L. ROTHROCK, A.M., M.D., *Clinical Professor of Diseases of Women*

GEO. C. BARTON, M.D., *Clinical Instructor in Gynecology*

ARTHUR E. BENJAMIN, M.D., *Clinical Instructor in Gynecology*

H. L. WILLIAMS, A.B., M.D., *Clinical Instructor in Gynecology*

COURSES OF INSTRUCTION

The course in the diseases of women consists of lectures, recitations, clinical instruction and the witness of operations upon the human subject, as they may offer.

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| 1. LECTURES AND RECITATIONS | PROFESSOR STONE |
| Two hours per week, first semester. | One hour a week, second semester. |
| Open to fourth-year students. | |

2. **CLINICAL COURSES AT THE CITY AND OTHER HOSPITALS IN MINNEAPOLIS AND ST. PAUL.** Observations and examinations of patients, methods of examination, diagnosis and treatment.
 Weekly clinics in Minneapolis hospitals, by Prof. Abbott, Dr. Benjamin and Dr. Williams.
 Weekly clinics held in St. Joseph's Hospital, St. Paul, by Prof. Stone.
 Weekly clinics held at the City and County Hospital, St. Paul, during January, February, and March, by Dr. Rothrock.

The above announcements represent the surgical work given in gynecology throughout the entire year. Every operation in this branch of surgery is presented in these clinics. Owing to the limited field within which this work must be done, the attempt is always made to divide the class into small sections. Daily clinics for small sections are held at the University and St. Paul Free Dispensaries by Drs. A. E. Benjamin, H. L. Williams, and J. L. Rothrock. This work is especially valuable since it brings the student into direct acquaintance with the patient. Individual instruction is given in history-taking, diagnosis, methods of examination, treatment and minor gynecology.

Text-Books:

Dudley's Diseases of Women.
 Reed's Text-Book of Gynecology.
 Kelly's Operative Gynecology.
 Collateral Reading—Penrose, Gleist and Ashton.

OBSTETRICS

PARKS RITCHIE, M.D., *Professor of Obstetrics*

A. B. CATES, A.M., M.D., *Professor of Obstetrics*

FREDERICK LEAVITT, M.D., *Clinical Professor of Obstetrics*

J. C. LITZENBERG, B.S., M.D., *Clinical Professor of Obstetrics*

JEANETTE M. McLAREN, M.D., *Clinical Instructor in Obstetrics*

F. L. ADAIR, M.D., *Clinical Instructor in Obstetrics*

COURSES OF INSTRUCTION

The subject of obstetrics is taught by lectures, recitations and demonstrations upon the manikin; by illustrative drawings and by attendance upon cases of labor. The didactic work is done in the third year; the clinical study is had in the fourth year. A large part of the obstetric service of the City Hospital in St. Paul and of the Minneapolis City Hospital is at the disposal of the department of obstetrics. Clinics are also held at other hospitals in St. Paul and Minneapolis.

1. THE ANATOMY AND PHYSIOLOGY OF THE PELVIC ORGANS

PROFESSORS CATES AND RITCHIE

(Lectures and recitations two hours a week in October and January, and three hours a week, second semester)

Open to third-year students.

The development of the embryo and appendages; pregnancy; symptoms and diseases; operative obstetrics; the complications of labor and its sequelæ.

2. THE THEORY AND PRACTICE OF OBSTETRICS

(Lectures and recitations two hours a week in November, December and January)

Open to third-year students.

The mechanism and conduct of normal labor, with its complications; abortions.

3. HOSPITAL WARD WORK

PROFESSOR LEAVITT

Twice a week, from January 1st to May 1st, small sections of the senior and junior classes will study the signs of pregnancy,

pelvimetry, obstetric diagnosis, the puerperal state, the early care of infants, incubation, etc., in the maternity wards of the City and County Hospital, St. Paul.

4. **CLINICAL OSTETRICS**

The study of and the participation in the conduct of two or more hospital deliveries in the fourth year under the direction of Professors Leavitt and Litzenberg. Also a number of confinements in maternities and private homes, conducted by Doctors Adair and Jeanette McLaren.

5. **MANIKIN DEMONSTRATIONS**

PROFESSOR LITZENBERG AND DR. ADAIR

Once a week during the third and fourth years the various positions, presentations and obstetric operations will be demonstrated by means of the manikin.

6. **RECITATIONS**

PROFESSORS LEAVITT AND LITZENBERG

(One hour a week)

First and second semesters

Open to fourth-year students.

This course will be a review of the subject of practical obstetrics by recitations.

Text-Books:

Edgar, Williams, Jewett, Lusk, Hirst, Peterson, and the American Text-Book of Obstetrics.

THE HISTORY OF MEDICINE

PROFESSOR BURNSIDE FOSTER

(Two hours a week)

Fourth year

An elective course of lectures is given on the history of medicine and of the medical profession from the earliest times, including accounts of the epoch-making discoveries in medicine, brief sketches of the lives of eminent physicians and an account of the great plagues in history.

MEDICAL JURISPRUDENCE

PROFESSOR SWEENEY

(Two hours a week)

Fourth year

A course of lectures and recitations, in the legal relations of medicine.

Text-Books:

Taylor's Medical Jurisprudence.

Collateral Reading—Withaus' Principles of Forensic Medicine and Toxicology; Wharton and Stille's Medical Jurisprudence; Reese's Medical Jurisprudence and Toxicology; Draper's Medical Jurisprudence.

THE COLLEGE OF HOMEOPATHIC MEDICINE
AND SURGERY

The College of Homeopathic Medicine and Surgery

FACULTY

CYRUS NORTHROP, LL., D., *President of the University*
EUGENE L. MANN, A. B., M. D., *Dean of the College*
694 Endicott Arcade, St. Paul

MATERIA MEDICA AND THERAPEUTICS

W. E. LEONARD, A. B., M. D., *Senior Professor*
Andrus Building, Minneapolis
ADOLPH W. JOHNSON, *Lecturer on Pharmacy*
H. O. SKINNER, M. D., *Lecturer on Pharmacology*

PRACTICE OF MEDICINE

H. M. LUFKIN, M. D., *Professor*
Masonic Temple, Minneapolis
O. H. HALL, M. D., *Professor, Renal Diseases*
Pittsburg Building, St. Paul
ANNA H. HURD, Phm. D., M. D., *Associate Professor, Diseases of Blood and*
Ductless Glands
Pillsbury Building, Minneapolis

CLINICAL MEDICINE AND PHYSICAL DIAGNOSIS

ASA H. HAMMOND, A. B., M. D., *Professor*
Germania Life Ins. Bldg., St. Paul
H. O. SKINNER, M. D., O. K. RICHARDSON, M. D., A. E. AHRENS, M. D.,
G. B. HAMLIN, M. D., *Assistants*

SURGERY

R. D. MATCHAN, M. D., *Senior Professor*
Masonic Temple, Minneapolis
W. S. BRIGGS, B.S., M.D., *Professor*
Pittsburg Building, St. Paul
A. E. COMSTOCK, M. Sc., M. D., *Professor, Regional Surgery*
N. Y. Life Building, St. Paul
A. E. BOOTH, A.B., M.D., *Professor of Orthopaedia*
Andrus Building, Minneapolis
W. B. ROBERTS, A. B., M. D., *Professor of General Surgery*
Pillsbury Building, Minneapolis
A. E. AHRENS, M. D., *Assistant*

OBSTETRICS

B. H. OGDEN, A. B., M. D., *Senior Professor*
Pittsburg Building, St. Paul

HUGH J. TUNSTEAD, M. D., *Professor*
829 16th Ave. N., Minneapolis

GYNAECOLOGY

R. R. ROME, M. D., *Senior Professor*
Andrus Building, Minneapolis

H. C. ALDRICH, M. D., *Professor*
Medical Blk., Minneapolis

E. E. AUSTIN, M. D., *Professor*
Andrus Building, Minneapolis

S. G. COBB, M. D., *Associate*

MEDICAL JURISPRUDENCE

ARTHUR W. SELOVER
Guaranty Building, Minneapolis

OPHTHALMOLOGY

H. H. LEAVITT, M. D., *Professor*
Pillsbury Building, Minneapolis

OTOLOGY, RHINOLOGY AND LARYNOLOGY

EUGENE L. MANN, A.B., M.D., *Professor*
Endicott Arcade, St. Paul

GEO. M. HAYWARD, M. D., *Clinical Professor*
Medical Building, Minneapolis

SKIN AND GENITO-URINARY DISEASES

C. H. NEILL, M. D., *Professor*
Medical Building, Minneapolis

PAEDODOLOGY

GEO. B. HAMLIN, M. D., *Professor*
506 Masonic Temple, Minneapolis

MEDICAL ECONOMICS

O. K. RICHARDSON, A.B., M.D., *Professor*
506 Masonic Temple, Minneapolis

ELECTRO-THERAPEUTICS

ETHEL E. HURD, M. D., *Associate Professor*
Pillsbury Building, Minneapolis

ANATOMY

C. A. ERDMANN, M. D., *Professor*
Pillsbury Building, Minneapolis

PHYSIOLOGY

R. O. BEARD, M. D., *Professor*
Pillsbury Building, Minneapolis

HISTOLOGY AND EMBRYOLOGY

T. G. LEE, B. S., M. D., *Professor*
The University

PATHOLOGY AND BACTERIOLOGY

F. F. WESBROOK, M. A., M. D., C. M., *Professor*
The University

CHEMISTRY

GEORGE B. FRANKFORTER, A. M., Ph. D., *Professor*
The University

Announcement

The College of Homeopathic Medicine and Surgery offers special advantages to students seeking a medical education. Homeopathy, as an expanding science, draws toward itself as a part of its rightful possession, every addition to medical knowledge that can be of any service in curing the sick. The homeopathic physician should feel that he is "heir of all ages" in medical learning, having that catholicity of training which places at his command every known resource, including as his especial advantage, the added power of coping with disease, that comes from his knowledge of the science of homeopathy.

The breadth of view of this result is provided in the college of homeopathic medicine and surgery in a real university course, botany, chemistry (organic and inorganic), histology, embryology, bacteriology, pathology, anatomy, physiology, hygiene and sanitary science, with all the accessories of laboratory work; second, in building upon this foundation a comprehensive knowledge of therapeutics, practice and surgery. The student has daily training in both the practical and theoretical aspects of medicine. In the first two years the practical training is provided in constant individual work in the laboratories and dissecting rooms; in the last two in a broad field of clinical study and observation, in both medical and surgical cases, which the nearly one-half million population of the Twin Cities abundantly supplies. The theoretical work is carried on in daily didactic lectures and text-book study throughout the entire course.

Special emphasis is placed upon the clinical instruction in both dispensary and hospital practice. Senior students have the opportunity to attend out-door patients, assist in special and general operations, and to attend obstetrical cases during the last course of lectures.

The college alumni now in practice are evidence of the character of its work. The loyal support of the profession throughout the northwest has encouraged and upheld the faculty.

The college proposes to stand for a broad, catholic, scientific, homeopathic education in medicine and surgery.

REQUIREMENTS FOR ADMISSION

I. Candidates for admission to the College of Homeopathic Medicine and Surgery who have received degrees in arts or science from approved universities or colleges will be admitted on presenting their diplomas or other satisfactory testimonials (subject to conditions under IV).

II. Students will be admitted who present evidence that they have satisfactorily performed the equivalent of at least two full years of work

of collegiate grade of fifteen hours per week (subject to conditions under IV).

III. Other candidates who have not completed the two years of required work will be required to pass examinations, conducted by the College of Science, Literature, and the Arts, upon such subjects as may be lacking (subject to conditions under IV).

IV. All candidates for admission must furnish evidence that they have completed one year of at least three credit* hours per week in each of the following named subjects, either in this University or in some other college or university of equal rank:

1. Physics
2. General Inorganic Chemistry
3. Qualitative Analysis
4. Biology, *i. e.*, Zoology or Botany
5. Language, *i. e.*, German or French

Since the two years of required collegiate work must include the aforementioned subjects, students are advised to choose the prescribed six-year course which leads to the degrees of bachelor of science and doctor of medicine. For detailed outline of this course see pages 25-30.

V. In addition students must offer for entrance two years of Latin.

VI. Candidates may be allowed to enter with not more than one condition in the second year of academic work. This condition, however, must be removed before the beginning of the second-year work in medicine.

For regulations governing admission to the College of Science, Literature and the Arts, and detailed information concerning its curriculum, see the bulletin of that college.

ENROLLMENT

Students are advised to matriculate or register in the office of the University Registrar on or before September 7, 1908. Entrance and condition examinations will be held September 7 to 12. Opening lecture, September 14th. Classes called for regular work on September 15.

Students are fined twenty-five cents per day who matriculate or register in the Registrar's office after September 14, 1908, for the first semester's work, or after February 2, 1908 for the second semester's work.

MATRICULATION

Students who are entering the College of Homeopathic Medicine and Surgery for the first time must present to the Registrar satisfactory evi-

* **NOTE.**—A credit hour in a laboratory subject is taken to be two or more hours of consecutive work.

dence of having completed the required amount of work for admission and obtain proper classification card and statement of fees. The Registrar will determine and record any deficiency in the entrance qualifications of student and will arrange with the student for the removal of such deficiencies.

Students who have matriculated in previous years must first present registration slips and obtain statement of fees in the Registrar's office at the beginning of each semester.

REGISTRATION

The registration of all students consists of three parts and should be carried out in the following order:

1st. Present registration slip to the Registrar and secure a statement of fees.

2nd. Present this statement at once to the cashier and pay fees.

3rd. Report to the dean at once for final classification and registration. Students must follow this order and complete registration as promptly as possible in order to secure tickets for entrance to the various courses.

As the rules of the Minnesota State Board of Medical Examiners and of the Council on Medical Education of the American Institute of Homeopathy and the examining boards of several other states, require four full years' work in a medical college, students are not given time credit for work done outside a medical school. However, when a student presents *satisfactory* evidence of good work done elsewhere, he may be given subject credit for such work, and be permitted to take *optional* or *advanced* work in the branches and for the time in which he has received subject credit. It is consequently of considerable advantage to a student to be able to present subject credits.

No student may be advanced with his class or given advanced standing unless he has passed the majority of the required studies of the previous year; nor shall any student be admitted to the second semester's work of the fourth year who has any unremoved conditions of any of the preceding years.

TERMS OF TUITION

The annual tuition fee in the College of Homeopathic Medicine and Surgery is one hundred dollars. This includes all charges for matriculation, lecture and laboratory courses, dissections and graduation, except a hospital fee of three dollars for juniors and seniors and a rental fee for microscopes, payable by all students who do not own their own instruments. (See microscope rental.)

One-half of the annual fee will be payable when the student matriculates. The cashier's receipt for this portion of the fee will entitle the student to take the entrance examinations and to classify. The second half will be payable at the opening of the second semester, February 2, 1909. Failure to register within the dates assigned for registration will subject the delinquent to an increase in the registration fee, amounting to twenty-five cents for each day of such delinquency. If the applicant fails to pass the entrance examination, his fees will be returned by the cashier. Absence or failure to continue study will not entitle the student to return of fees, except in cases of special hardship, when application may be made to the executive committee of the Board of Regents.

A student who takes advanced standing will not receive any credit therefor upon his annual fees.

The fee of one dollar is charged for permission to take any examination to remove a condition. The student obtains a fee statement from the Registrar for the conditions charged against him, this he presents to the cashier, and the cashier's receipt must be registered with the dean at least twenty-four hours prior to the examination.

Special examinations may be ordered by the faculty under exceptional circumstances for which a fee of five dollars must be paid to the University cashier.

MICROSCOPE RENTAL

To students who do not own their own instruments, microscope fees are charged as follows: First year, first semester, four dollars; second year, first semester, three dollars; second semester, four dollars; third year, first semester, four dollars. Fourth year, clinical microscopy, two dollars.

In all elective courses requiring the use of microscopes, the fee of two dollars for each course is charged.

BREAKAGE AND LOSS

In each laboratory course the student will be assigned a certain amount of apparatus and material, for which he will give a receipt.

For apparatus and material attaching to his laboratory desk he will also be held responsible. At the end of each course, if such apparatus and material are restored in good condition, this receipt will be returned to him.

A deposit of five dollars will be made with the University cashier each year, by every student, at the time of enrollment as a caution fee. This fee is intended to cover the cost of unnecessary damage in the college buildings and of breakage and loss of laboratory apparatus and materials. It will be returned to the student at the close of each year, minus the cost

of articles assigned to him, which are not returned in good condition, or of damage to college property for which he is individually responsible. If responsibility for such damage cannot be individually fixed, a pro rata charge upon all students will be made.

GRADUATE AND SPECIAL STUDENTS

Special students will pay to the cashier a fee of twenty dollars per year for each study they elect to pursue. They will be charged additional fees, varying from five to twenty dollars, for each laboratory course they may enter.

Graduate students will pay an admission of ten dollars, which will entitle them to attend any lectures they may desire in regular courses.

Additional charges varying from ten to twenty dollars per course are made for laboratory courses, and microscope rental must also be paid.

EXAMINATIONS—FINAL STANDINGS

No student with an entrance condition will be allowed to register for any second-year subject, nor will any student with any first-year condition or failure be allowed to register for a third-year subject; nor will any student having a second-year condition or failure be allowed to register for any fourth-year subject.

No student will be allowed to omit any freshman work in order to make up entrance conditions, except by special permission of the department affected.

Habitual absence without satisfactory excuse, continued indifference to study, or persistently poor scholarship will subject the student to temporary or permanent suspension.

Students will not be permitted to substitute work in any branch for the regular college courses.

Final examination in every required subject is held at the close of the work at the end of the semester or quarter, according to the extent of the course given. Opportunity is offered to remove conditions at the opening of the school year in September. The examinations at the end of the semester or quarter are only for those who are taking the courses, while the September examinations are only for those who are attempting to remove conditions or are applicants for advanced standing.

The final standing of any student in a given subject shall be determined as the result of his (a) practical work (laboratory or clinical), (b) recitations, and (c) oral or (d) written examinations.

All of these factors shall be taken into consideration in making up the final grading in any subject.

Students' standings shall be determined at the end of the year by a conference of the heads of the departments, in which the work is pursued during the year.

All standings shall be reported officially to and from the registrar's office at the end of the year.

Students shall be reported as Passed, Incomplete, Conditioned or Failed.

No student will be registered for any examination to remove conditions until he presents a receipt from the cashier for the fee for said examination. (See Terms of Tuition.)

Conditions must be removed at the beginning of the school year in September. No student who has any conditions unremoved at the close of this examination is allowed to continue with his class without the express permission of the dean on the recommendation of the department concerned.

A condition not removed at the first opportunity becomes a failure subject to the rule governing failures.

Failures necessitate the taking of the work again in class.

A student repeating work, by reason of having failed, must pay the fees connected with that course.

A student who is conditioned in the majority of the subjects given in any year will become a "failed" student and must repeat the whole work of that year.

Students who carry failures into a succeeding year may find a resultant conflict of study hours; in that event they will give preference to the unfinished studies of the lower conflicting course.

ADVANCED STANDING

All persons applying for advanced standing must present satisfactory evidence of time spent in medical studies, as well as official credentials, their own records, notes, drawings, and other evidence of work covered and pass examinations in the branches already taken by the class they seek to enter and satisfy all other admission requirements, but any student who has satisfactorily completed the requirements of any department of this college in any other medical college of recognized standing may be excused from repeating such examinations if the instruction which he has received is considered satisfactory by the head of the corresponding department in this college.

No condition of advanced standing will entitle the student to take the two years of any graded study coincidently.

Seniors in the College of Science, Literature, and the Arts, or in other recognized colleges, who contemplate entering the department of medicine,

are permitted to elect courses in anatomy, histology, embryology, neurology, physiology and chemistry in this department in lieu of equivalent science courses in the College of Science, Literature, and the Arts or in other colleges.

REQUIREMENTS FOR GRADUATION

The degree of doctor of medicine is conferred by the Board of Regents upon the students who are recommended by vote of the faculty for graduation. Candidates for the degree must possess the following qualifications :

Every candidate for the degree of doctor of medicine must be at least twenty-one years of age, and of good moral character. He must have satisfied all the requirements for admission to the College of Homeopathic Medicine and Surgery and have completed in a satisfactory manner the full four years' course of study in this college.

The degree of doctor of medicine will also be given to candidates who have completed a portion of their medical work in some other recognized medical school, provided that they have satisfied all entrance requirements and have completed a four years' course of medical study equivalent to the standards maintained here, of which the final year must be spent in this college.

A graduate of another medical school of recognized standing may obtain the degree of doctor of medicine at this University by fulfilling all the requirements for undergraduates, completing in full the final year's work in this college, and passing satisfactory examinations.

Clinical and Laboratory Facilities

The medical group of buildings is located on the University campus overlooking the Mississippi river and is between the business centers of the Twin Cities and connected therewith by two trunk trolley lines which bring the student in ready connection with all the hospitals of the two cities. The quadrangle contains Millard Hall, Medical Science Building, the Chemistry laboratories, the laboratory of Anatomy and the Institute of Public Health and Pathology, while use is made of the laboratory of Animal Research of the State Board of Health, which immediately adjoins the Institute of Public Health and Pathology.

The University Hospital for the department of Medicine and Surgery, the gift of the late Dr. A. E. and Mrs. Elliott and Mr. Walter J. Trask, of Los Angeles, Cal., is in the process of construction at a cost of about \$120,000. The hospital is being located on a site of ten acres overlooking the river and will form a part of the present medical group of buildings. This hospital site of ten acres was purchased by means of a gift of

\$50,000 from generous citizens of Minneapolis to the college. Provision for the enlargement of the hospital site and for the acquirement of the land which intervenes between it and the medical quadrangle has already been made by the last state legislature's appropriation of \$450,000 for campus extension.

CLINICS

Every member of the faculty (with two exceptions) is a clinical teacher. Thus each professor demonstrates the application of his didactic work.

DISPENSARY CLINICS

The dispensary, located at 1808 Washington avenue south, offers unusual facilities to the student for individual examination of patients. The location is within easy access of those whose means compel them to ask dispensary assistance, and presents ample opportunity for the study of all forms of diseases usually met with in practice. Patients present themselves in large numbers daily (more than six thousand prescriptions having been made during the past year), and are assigned to particular departments, according to the nature of their diseases. The classes are so divided and arranged as to afford every student abundant opportunity to familiarize himself with the best methods of diagnosis and treatment of the various maladies, medical and surgical, with which the clinic abounds. Each student is assigned for a definite period as clinical assistant in each department of the clinic. The college clinics are conducted throughout the entire year. Students and practitioners are invited to attend them at all times.

HOSPITAL CLINICS

The college has unusual advantages in hospital clinics. In addition to calling upon students to assist the various professors in private cases regular clinics are provided in the city hospitals of both St. Paul and Minneapolis, and in St. Luke's and St. Joseph's Hospitals in St. Paul. Each Monday and Tuesday is devoted to clinics held in one of these hospitals by members of the faculty.

CITY HOSPITAL, MINNEAPOLIS

The faculty of the college of homeopathic medicine and surgery is largely represented on the staff of this institution, where one-fifth of all the patients admitted are placed under care.

CITY HOSPITAL, ST. PAUL

This hospital likewise has a full staff of homeopathic physicians and surgeons which include all the St. Paul members of the college faculty.

Each member of the staff has full charge of all cases coming into his department during his term of service and uses suitable ones for clinical purposes.

ST. LUKE'S HOSPITAL, ST. PAUL

This hospital has recently erected a new building thoroughly equipped with all modern facilities for caring for medical and surgical cases. It contains an amphitheatre in which clinical lectures are delivered. A number of the faculty are members of the visiting staff.

ST. JOSEPH'S HOSPITAL, ST. PAUL

Through the addition to its staff of members of the college faculty, students have access to both surgical and medical cases upon exactly the same footing as at the other hospitals.

GENERAL REMARKS

In all hospital work students are given special bedside instruction in diagnosis, in "taking the case," in prescribing, in surgical dressing, in the after care of patients and all forms of accessory treatment.

HOSPITAL APPOINTMENTS

Graduates of this college are eligible for appointment to the position of interne in the Minneapolis City, St. Paul City and County Hospitals and St. Joseph's Hospital, St. Paul. Also to the staff of the State Hospital for Insane at Fergus Falls.

The College hereby acknowledges favors extended by Dr. G. O. Welsh and his assistants at the Fergus Falls Insane Asylum for practical instruction to the Senior Class in Mental Diseases.

All communications pertaining to the College of Homeopathic Medicine and Surgery should be addressed to the Dean, Eugene L. Mann, A. B., M. D., 694 Endicott Arcade, St. Paul, Minn.

LIBRARY OF MEDICAL DEPARTMENT

Thomas G. Lee, B.S., M.D., Librarian

The medical library consists of the following collections: The general clinical library, the libraries of the colleges of Dentistry and Pharmacy, the departmental libraries of pathology and bacteriology, histology and embryology, anatomy, and physiology. These contain nearly 10,000 bound volumes, 14,000 unbound volumes, monographs, reprints, dissertations, and about 175 current periodicals. In addition to the above, the library of the State Board of Health, of Hennepin County Medical Society, containing 4,000 volumes and 50 journals, and of the Ramsey County Medi-

ty with some 7,000 volumes and 150 journals, give the student additional opportunity to consult all the more important medical publications. The general University library contains some 115,000 bound volumes, 10 unbound volumes and pamphlets, and several hundred current journals. The public libraries of Minneapolis, with 160,000 volumes, of St. Paul, with some 90,000 volumes, the State Historical Library 100,000 volumes, and the State Library of 59,000 volumes, the Library of Minnesota Academy of Natural Sciences of some 12,000 titles, place at the student the greater part of the important literature relating to branches of the physical and natural sciences as well as works of general culture and those pertaining particularly to medicine. All of these collections are readily accessible to the student.

A noteworthy addition to the medical library is the recent acquisition of a department of histology and embryology, through the generosity of J. F., John S. and Charles C. Pillsbury, of a large portion of the personal library of the late Professor William His, of Leipzig, containing 8,500 titles and representing some 2,500 authors.

LABORATORY BUILDINGS AND EQUIPMENT

Over \$500,000.00 is invested in the laboratories and equipment of this college exclusive of site.

The location of the medical buildings in a central portion of the campus offers all the advantages to student and staff which come from an association with the other University departments, such as general library, laboratories of physics, chemistry, biology, botany, geology, etc.

Willard Hall, a large, four story, brown stone, and cream brick building (65x125 ft.) the oldest of any in the group, contains a faculty room, an amphitheatre and lecture rooms, library and reading rooms of the department together with the laboratory of pharmacology and materia medica.

The Medical Science Building, a large, four-story, brick building, (50 ft.), is especially designed for laboratories. This building houses the department of histology and embryology and the department of physiology of this college. A portion of the south wing is temporarily occupied by the College of Pharmacy.

The department of histology and embryology occupies the four floors of the north wing and a part of the center of the building and the department of physiology occupies the greater part of the south wing and the remainder of the building.

Chemistry is taught in two buildings. The main, four-story, brick building (198x78 ft.) constitutes the headquarters of the School of Chemistry.

The laboratory of medical chemistry is a one-story, brick building

devoted to the use of this department and is included as a part of the Medical Quadrangle. It is equipped with an amphitheatre, two teaching laboratories (3,800 sq. ft.), preparation rooms, balance room, storage rooms and private offices of the staff of this department.

The laboratory of anatomy is a two-story, basement building.

The Institute of Public Health and Pathology is the newest of any in the Medical Quadrangle.

SIX-YEAR COURSE IN SCIENCE AND MEDICINE LEADING TO THE DEGREES OF BACHELOR OF SCIENCE AND DOCTOR OF MEDICINE

In the year 1903-04 the University established a six-year course of study arranged especially for students of medicine. The first two years of the course are given in the College of Science, Literature and the Arts, and the last four years are given in the medical department. It leads to the degree of bachelor of science at the end of the first four years, and to the degree of doctor of medicine at the end of the six-year course.

In the College of Science, Literature, and the Arts the year is divided into two semesters. In the medical department the year is divided into four quarters (half semesters). In the College of Homeopathic Medicine and Surgery the work is given on a concentration plan, but two subjects being carried on at a time, and consequently a greater number of hours per week.

Students who enter without French or German are required to take Beginning German, Course 1, ten credits, and Scientific German, Course 3, six credits.

Students entering with two years of German may take Beginning French, Course 1, ten credits, in either first or second year, and German, Course 3, six credits, in the other year.

Page references refer to the bulletins of the College of Science, Literature, and the Arts, and of the College of Homeopathic Medicine and

FIFTH YEAR

First Semester

CLINICS 6	PROFESSORS LUFKIN, HAMMOND, OGDEN, COMSTOCK, ROBERTS, LEAVITT, HAMLIN, LEONARD, ALDRICH, TUNSTEAD, NEILL, BOOTH, RICHARDSON, MATCHAN; DRs. BECK, COBB, HAYWOOD, SKINNER, DAWSON.
I. GYNAECOLOGY 1	PROFESSOR ALDRICH
III. MATERIA MEDICA 2	PROFESSOR LEONARD
NOSE, THROAT AND EAR 1	PROFESSOR MANN
I. OBSTETRICS 1	PROFESSOR TUNSTEAD
PHYSICAL DIAGNOSIS 1	PROFESSOR HAMMOND
I. PRACTICE OF MEDICINE 3	PROFESSOR LUFKIN
SPECIAL PATHOLOGY	
III. SURGERY 1	PROFESSOR ROBERTS
V. SURGERY 2	PROFESSOR COMSTOCK

Second Semester

CLINICS 6	(as first semester)
I. GYNAECOLOGY ½	PROFESSOR ALDRICH
III. MATERIA MEDICA 2	PROFESSOR LEONARD
NOSE, THROAT AND EAR 1	PROFESSOR MANN
I. OBSTETRICS ½	PROFESSOR TUNSTEAD
PHYSICAL DIAGNOSIS ½	PROFESSOR HAMMOND
I. PRACTICE OF MEDICINE 3	PROFESSOR LUFKIN
V. and VI. SURGERY 3	PROFESSORS COMSTOCK, MATCHAN
I. SURGICAL ANATOMY 1	PROFESSOR BOOTH
MEDICAL JURISPRUDENCE ½	MR. A. W. SELOVER

SIXTH YEAR

First Semester

CLINICS 6	(as first semester, fifth year)
DERMATOLOGY AND GENITO URINARY 1	PROFESSOR NEILL
ELECTRO THERAPEUTICS 1	ASSOCIATE PROFESSOR E. E. HURD
II. GYNAECOLOGY ½	PROFESSOR AUSTIN
IV. MATERIA MEDICA 2	PROFESSOR LEONARD
MEDICAL ECONOMICS 1	PROFESSOR RICHARDSON
MENTAL DISEASES 2	DR. G. O. WELSH
II. OBSTETRICS 1	PROFESSOR OGDEN
OPHTHALMOLOGY 1	PROFESSOR LEAVITT
ORTHOPAEDIA 1	PROFESSOR BOOTH
PAEDOLOGY 1	PROFESSOR HAMLIN
I. PRACTICE OF MEDICINE 3	PROFESSOR LUFKIN
V. SURGERY 2	PROFESSOR COMSTOCK

Second Semester

CLINICS 6	(same as first semester, fifth year)
III. GYNAECOLOGY 1	PROFESSOR ROME
IV. MATERIA MEDICA 2	PROFESSOR LEONARD
II. OBSTETRICS 1	PROFESSOR OGDEN
OPHTHALMOLOGY 1	PROFESSOR LEAVITT
ORTHOPAEDIA 1	PROFESSOR BOOTH
I. PRACTICE OF MEDICINE 3	PROFESSOR LUFKIN
II. PRACTICE OF MEDICINE ½	ASSOCIATE PROFESSOR ANNA HURD
III. PRACTICE OF MEDICINE ½	PROFESSOR HALL
V. SURGERY 2	PROFESSOR COMSTOCK
VI. SURGERY 1	PROFESSOR MATCHAN
IV. SURGICAL PATHOLOGY 1	PROFESSOR ROBERTS

Seven-Year Course Leading to the Degree of A. B. and M. D.

Seniors in the College of Science, Literature and the Arts and in other colleges, who contemplate entering the College of Homeopathic Medicine and Surgery, are permitted to elect courses in anatomy, histology and embryology, physiology and chemistry in this college in lieu of similar science courses in the College of Science, Literature and the Arts or in other colleges.

AFFILIATION WITH OTHER COLLEGES

Carleton College has entered into an arrangement with the University of Minnesota whereby students from Carleton who have completed three full years' work without conditions and who have also met all the requirements for admission to the College of Homeopathic Medicine and Surgery may elect as the work of their senior year the first year's work in the College of Homeopathic Medicine and Surgery, upon the satisfactory completion of which they will receive a bachelor's degree from Carleton College.

By this arrangement students from this college, having satisfactorily completed their four years' work in the College of Homeopathic Medicine and Surgery, will have received both degrees in a period of seven years.

Opportunity is offered to other colleges meeting the University requirements to enter into similar relations of affiliation for the purpose of shortening the time whereby a student can secure both degrees.

CURRICULUM

The course in the College of Homeopathic Medicine and Surgery leads to the degree of doctor of medicine. It covers a period of four years of collegiate study, each year representing nine months in actual residence.

The studies are graded, so far as practicable, throughout the four years and this grading is arranged with careful reference to the relation which the subjects naturally bear to each other.

The work of the first two years deals with the so-called scientific or laboratory branches; while that of the last two years includes the principles and practice of medicine and surgery, their associated specialties and the application of scientific or laboratory methods to clinical experience.

COLLEGE YEAR

The twenty-first annual course of study in this college will begin on Tuesday, September 14, 1908, and will continue nine months, or thirty-six weeks, exclusive of holidays, closing upon Saturday, June 5, 1909. The college year is divided into two semesters; each semester is further divided into two quarters of nine weeks each; the first semester ends January 30, 1909. The last week is devoted mainly to mid-year examinations, which will be conducted in many of the departments. The second semester will begin February 2, 1909, and will close June 5, 1909. Certain of the courses of study terminate on November 14th, and April 3d. Commencement exercises will occur in common with the other departments of the University, during the week ending June 11, 1909.

Course of Instruction

DEPARTMENT OF ANATOMY

THOMAS G. LEE, B. S., M. D.
Professor of Histology and Embryology

JOHN BLACK JOHNSTON, Ph. D.,
Associate Professor in Comparative Neurology

WINFIELD S. NICKERSON, Sc.D., M.D.
Assistant Professor of Histology and Embryology

JARL FERDINAND LEMSTROM, M.D.,
Assistant in Micro-Technique

CHARLES E. INGBERT, Ph.D., M.D.,
Associate in Neurology

E. M. WATSON, B.A., *Departmental Laboratory Assistant*

KATE WYMAN, B.A., *Departmental Laboratory Assistant*

CHARLES A. ERDMANN, M. D.,
Professor of Anatomy

ARTHUR W. MEYERS, B.S., M.D.,
Assistant Professor of Anatomy

EARLE R. HARE, B.A., M.D.,
Instructor in Anatomy

C. C. TYRELL, B.A., M.D.,
Prosector in Anatomy

E. E. HEMINGWAY, Ph. D.,
Assistant in Anatomy

The department of anatomy is located in two separate buildings, adapted to its work, and equipped with the best modern appliances. The building devoted to gross anatomy includes one large students' dissecting room, the general laboratories of anatomy, a bone laboratory for osteological research work, the offices of the professor and assistants in anatomy, preparation rooms and morgue. An ample supply of dissecting material is provided.

In the first year the subjects of osteology and syndesmology are pursued by means of lectures, laboratory demonstrations and recitations from the specimen.

The bones of a human skeleton are loaned to the student for purposes of study and recitation.

Myology, angiology, splanchnology and neurology are studied in connection with the dissection and laboratory demonstrations of the thoracic, abdominal and pelvic viscera upon the lower animal. This is followed by the dissection of the human body and a comparative brain.

In the second year the alimentary canal, respiratory tract, genito-urinary system, organs of special sense and the cerebro-spinal nervous system are pursued by means of lectures, recitations and laboratory demon-

strations. The dissection of the human body is repeated and followed by a series of lectures and demonstrations on descriptive and surgical anatomy. The student dissects in the first semester of the first year and in the first half of the second semester of the second year, recites upon the subject and observes demonstrations made by a corps of assistants under the direction of the professor of anatomy.

Dissection is supplemented by drawings from dissections made upon outlines of the human skeleton, which are furnished to the student.

In the third year the student takes up the study of the human body from a topographical and surgical standpoint and is given a thorough review of the surgical regions, emphasizing the practical points in relation to their clinical application.

The work in microscopic anatomy, histology, embryology, neurology and micro-technique occupies all four floors of the entire north wing and center of the Medical Science Building, amounting to about 17,000 square feet. The main laboratory on the first floor measures 44x72 feet, lighted by windows on three sides and a part of the fourth. Each student is provided with a sink, gas, electric light, copper heating table, microscope locker and microscope, and a locker for the storage of apparatus and material. On the other floors there are to be found a lecture room and well equipped laboratories for courses in neurology, micro-technique, experimental work in histology and embryology, private rooms for investigators, various storage and preparation rooms, and rooms for reconstruction, chemical, photographic and photomicrographic work. These various laboratories and rooms are very well equipped with microscopes, microtomes, thermostats, a great variety of technical glassware, and other apparatus.

The departmental library contains a carefully selected collection of reference literature, both standard and periodical. There has been recently added to the library a large part of the working anatomical library of the late Professor William His of Leipzig, amounting to about 8,500 titles by 2,500 authors. In addition to this collection the other libraries of the University, together with the public libraries of Minneapolis and St. Paul, give the students access to practically all of the important literature relating to the work of this department.

The courses are made as practicable as possible, the student making a large number of permanent preparations for his own use. In addition each student is loaned a number of complete embryological series of mammalian and other vertebrate embryos cut in different planes and illustrative of different stages of development.

The lecture courses are illustrated by charts and lantern slides made from histological and embryological specimens. Demonstrations are given

under the projection or compound microscope of typical sections of tissues and organs accompanied by camera lucida drawings or photo-micrographs with explanatory text.

All students are recommended to purchase a microscope at the beginning of the course. This instrument is an indispensable part of the outfit of a well trained physician. Suitable microscopes can be purchased for from \$50 to \$75 which may be fitted with such other parts as may be desired. Students not owning microscopes will be furnished with instruments at a rental fee.

GROSS ANATOMY

1. **HUMAN OSTEOLOGY** PROFESSOR ERDMANN AND DR. HARE
Six credits (eighteen lectures and recitations per week for six weeks) First quarter

Required of freshmen.

Lectures and recitations upon the human skeleton and supplementary work on the osteology of domestic animals. A practical study of the skeleton, followed by recitation from the specimen.

2. **SYNDESMOLOGY** PROFESSOR ERDMANN AND DR. HARE
Three credits (eighteen lectures and recitations per week for three weeks) First quarter

Required of freshmen.

Lectures and recitations upon the articulations, their structure and function.

- DISSECTION** ASSISTANT PROFESSOR MEYER, DRs. HARE AND TYRELL
Seven and one-half credits (twenty-one hours each week for nine weeks) Second quarter

Required of freshmen. Open to students who have completed course 2.

The student makes a complete dissection of all the structures of either the upper or lower half of the human body, using text-books, atlases and models as guides. The work is largely independent, and a dissection must be completed in the quarter in which it was undertaken.

- DISSECTION** ASSISTANT PROFESSOR MEYER, DRs. HARE AND TYRELL
Nine credits (twenty-four hours each week for nine weeks) Third quarter

Required of sophomores.

In this course the student completes the dissection of the other half of the human body.

- TOPOGRAPHICAL AND SURGICAL ANATOMY** PROFESSOR ERDMANN
One and one-half credits (three hours, lectures and recitations each week for nine weeks) Third quarter

Required of juniors. Open to students who have completed courses 1, 2, 3 and 4.

A comprehensive review of the relations of structures composing the surgical regions of the human body; demonstrations with dissections, lantern, and upon the living model, showing the anatomical and surgical landmarks, and their applications.

6. **THE LYMPHATIC SYSTEM** ASSISTANT PROFESSOR MEYER

A comprehensive review of the human lymphatic system including the tonsils, adenoids and hemolymph glands. This course will consist of a series of lectures incorporating the results of recent research, and demonstrations on specially prepared dissections and injections, supplemented by a consideration of the lymphatic system of some of the lower vertebrates.

Students who have completed their dissections are eligible. This and the following course will be given at an hour which is most convenient for those electing it.

7. **THE GENITO-URINARY ORGANS** ASSISTANT PROFESSOR MEYER
 The scope of this course is similar to the above, but students will be expected to do actual laboratory work on gross sections made in various planes, of the cadavers of fetuses near term, of infants, adolescents and adults. An opportunity will also be afforded to study specially prepared dissections and preparations, and the aim will be to consider the human reproductive organs in their broadest relations as well as in their minute anatomical details. The development history will be referred to only as required. This course will be given under the same conditions as the above.
8. **TOPOGRAPHICAL ANATOMY OF CROSS SECTIONS** PROFESSOR ERDMANN
AND DR. TYRELL
 Open to third and fourth year students.
 A series of lectures and demonstrations, supplemented by the individual study of frozen and specially prepared cross sections of the human body, and a series of lantern slides representing actual sections.
9. **RESEARCH WORK** PROFESSOR ERDMANN
 The laboratory is equipped for the original investigation of anatomical problems. Students suitably fitted who have the time to do such work are encouraged to undertake it.
10. **ADVANCED PRACTICAL ANATOMY** PROFESSOR ERDMANN
 Opportunity is afforded for advanced work in practical anatomy to suitably trained students and practitioners, at any time during the college year.

HISTOLOGY, EMBRYOLOGY AND NEUROLOGY

1. **GENERAL VERTEBRATE MORPHOLOGY AND HISTOLOGY** PROFESSOR LEE,
ASSISTANT PROFESSOR NICKERSON
 Four and one-half credits (six lectures and recitations, and six hours laboratory work per week) First quarter
 Open to freshmen.
 The structure and properties of protoplasm; the cell, its structure; the phenomena of cell division. A comparative study of the histology of the epithelial, connective and muscular tissues, the blood, and the vascular and lymphatic systems of man and vertebrates.
2. **MICROSCOPIC ANATOMY OF MAN AND VERTEBRATES** PROFESSOR LEE,
ASSISTANT PROFESSOR NICKERSON
 Four and one-half credits (six hours lecture and recitation, and six hours laboratory work per week) Second quarter
 Open to freshmen who have completed course 1 or equivalent.
 A comparative study of the morphology, microscopic anatomy, origin and development of the various organs of the alimentary, respiratory, and uro-genital systems.
3. **MICRO-TECHNIQUE AND THE MORPHOLOGY OF THE SPECIAL SENSE ORGANS** PROFESSOR LEE
 Four and one-half credits (six hours lecture and recitation and six hours laboratory work per week) Third quarter
 Open to sophomores or those who have completed courses 2 and 12, or equivalent.
 A detailed study of the structure of the organs of special sense, together with practical exercises in micro-technique, methods of fixation embedding, sectioning, staining, reconstruction etc.
5. **DENTAL HISTOLOGY AND EMBRYOLOGY** ASSISTANT PROFESSOR NICKERSON
 Three credits (four lectures, four recitations, eight hours laboratory per week) Fourth quarter
 Open to first-year students. A modified course specially arranged and open only to dental students.
 The structure and histogenesis of the organs and tissues, the structure and development of the teeth and jaws, the mouth, cavity and glands.

7. **CYTOLOGY AND HISTOGENESIS** PROFESSOR LEE
Three credits (lectures and laboratory)
Elective course open to students who have had course 3 or 13, or equivalent.
Third quarter
10. **RESEARCH WORK IN HUMAN AND VERTEBRATE MORPHOLOGY** PROFESSOR LEE
Properly qualified students will be provided every facility for original investigation of anatomical problems.
11. **ELEMENTS OF VERTEBRATE EMBRYOLOGY** PROFESSOR LEE, ASSOCIATE PROFESSOR JOHNSTON
Four and one-half credits (six lectures and recitations, and six laboratory hours per week)
Open to first-year students.
First quarter
A comparative study of reproduction; the ovum, the spermatozoan, fertilization, cleavage, formation of the blastodermic layers, the formation of the embryo and foetal envelopes, with practical work on mammalian and other vertebrate embryos.
12. **ADVANCED VERTEBRATE EMBRYOLOGY** PROFESSOR LEE, ASSOCIATE PROFESSOR JOHNSTON
Three credits (six lectures and recitations, and six hours laboratory per week)
Open to first-year students who have completed course 11 or equivalent.
Second quarter
A comparative study of human and mammalian embryos, including impregnation, segmentation and implantation of the ovum, the formation, structure and relationships of the placenta and the foetal envelope, and the details of organogenesis studied in a practical manner upon a very large collection of serial sections of human and mammalian embryos cut in various planes, and representing all phases of development.
13. **SPECIAL EMBRYOLOGY OF MAN AND VERTEBRATES** PROFESSOR LEE
Four and one-half credits (six lectures and recitations, and six hours laboratory per week)
Open to second-year students who have completed courses 2 and 12.
Third quarter
A study of assigned problems including the elements of teratology.
17. **EXPERIMENTAL EMBRYOLOGY**
Three credits (lectures and laboratory)
Special course for advanced students.
Fourth quarter
20. **THE ANIMAL PARASITES OF MAN** ASSISTANT PROFESSOR NICKERSON
Three credits (six hours per week lectures and laboratory)
Third quarter
An elective course in Medical Zoology. The general outlines of the morphology and classification of the different groups which contain members parasitic upon man, with special consideration of each species of medical importance, including its distribution, life history, methods of infection, means of diagnosis, and the chief symptoms produced by it.
21. **ELEMENTS OF MAMMALIAN NEUROLOGY** ASSOCIATE PROFESSOR JOHNSTON AND DR. INGBERT
Three credits (six lectures and recitations, and six hours laboratory per week)
Open to first-year students who have completed courses 1 and 11, or equivalent.
Second quarter
A study of the structure and relations of the nerve elements and of the general morphology of the central nervous system.
22. **THE HUMAN NERVOUS SYSTEM** ASSOCIATE PROFESSOR JOHNSTON AND DR. INGBERT
Four and one-half credits (six lectures and recitations, and six hours laboratory)
Open to second-year students who have completed courses 11, 12 and 21, or equivalent.
First quarter
A detailed study of the internal structure and functional organization of the central nervous system by means of sections of the human brain, with comparison of mammals and lower vertebrates.

DEPARTMENT OF CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., *Professor of Chemistry*
 CHAS. F. SIDENER, B.S., *Professor of Chemistry*
 EDWARD E. NICHOLSON, M.A., *Assistant Professor of Chemistry*
 EVERHART P. HARDING, M.S., Ph.D., *Assistant Professor of Chemistry*
 IRA HARRIS DERBY, B.S., *Assistant Professor of Chemistry*
 LILLIAN COHEN, M.S., *Instructor in Chemistry*
 FRANCIS C. FRARY, M.S., *Instructor in Chemistry*
 JOHN A. HANDY, Ph.C., *Instructor in Chemistry*
 JAMES ZIMMERMAN, B.A., *Instructor in Chemistry*
 WALTER L. BADGER, B.A., *Instructor in Chemistry*

CHEMISTRY

1. **GENERAL CHEMISTRY** MISS COHEN AND MR. BADGER
 Six credits (six hours per week) Both semesters
 Open to all who do not present any entrance credits in chemistry;
 but juniors and seniors receive only half credit; both semesters
 must be completed before credit is given for the first semester;
 the laboratory fee is five dollars per semester.
 Recitations and laboratory work; the course includes a study of
 the common elements and their compounds, with an introduc-
 tion to the modern theories of chemistry.
2. **ADVANCED GENERAL CHEMISTRY** PROFESSOR FRANKFORTER
 Six credits (six hours per week) Both semesters
 Open to all who have completed a satisfactory course in general
 chemistry; both semesters must be completed before credit is
 given for the first semester; the laboratory fee is five dollars
 per semester.
 Lectures and laboratory work; the ground covered includes an
 introduction to physical and technological chemistry, with an
 exhaustive study of the chemical elements.
3. **QUALITATIVE ANALYSIS** PROFESSOR NICHOLSON AND MR. FRARY
 Six credits (six hours per week) Both semesters
 Open to those who have completed course 2; the laboratory fee
 is five dollars per semester.
 Lectures and laboratory work, with recitations and collateral
 reading. The course includes the general reactions of the
 metals and the acids, with their qualitative separation. Besides
 this mechanical work, the ionic theory and the law of mass
 action are discussed with special reference to common quali-
 tative reactions.
6. **ORGANIC CHEMISTRY** PROFESSOR FRANKFORTER
 Six credits (six hours per week) Second semester
 Open to those who have completed course 3; the laboratory fee
 is ten dollars.
 Lectures and laboratory work. The course includes an exhaustive
 study of the theories of organic chemistry, with one or more
 important preparations in each of the advanced series and
 groups of compounds.
7. **TOXICOLOGY AND HYGIENE** PROFESSOR FRANKFORTER, ASSISTANT
PROFESSORS HARDING AND DERBY
 Open to first-year students Second semester
Toxicology.—This course includes the general methods for the
 separation and identification of the poisons both organic and
 inorganic. Attention will be given to the identification of
 poisons associated with medicines and with vegetable and ani-
 mal matter. Besides this qualitative and quantitative work,
 attention is given to the structure of those organic groups of

compounds which have poisonous properties.

HYGIENE.—Chemistry lectures and laboratory work. This course includes the chemical analysis of air, water, and some of the common foods, milk, sugar and fruit products. Special attention is given to food adulteration and to food preservations.

For work in other special or technical lines in chemistry, numerous courses are offered (see Bulletin of the School of Chemistry). Facilities for research work are also afforded in a large number of lines.

The analysis of the urine is dealt with under physiological chemistry in the department of physiology, in the pathology of the urinary system in the department of pathology, and in the clinical laboratories in connection with the microscopy of the urine.

DEPARTMENT OF PHYSIOLOGY

RICHARD O. BEARD, M.D., *Professor of Physiology*

M. R. WILCOX, M.D., *Assistant Professor of Physiology*

F. H. SCOTT, M.A., M.D., Ph.D., *Assistant Professor of Physiology*

JULIUS PARKER SEDGWICK, B.S., M. D., *Instructor in Physiological Chemistry*

COURSES OF INSTRUCTION

The department of physiology occupies rooms in the medical science building, including a laboratory of experimental physiology, a laboratory of physiological chemistry, demonstration and recitation rooms, the laboratory library and the office of the chief of the department. A large amphitheater adapted to the demonstration of major experiments adjoins the laboratory and is used by the department for lecture purposes.

In the basement of the medical science building is a well-equipped workshop for the manufacture and repair of apparatus. Here, also, are animal rooms, furnished with enclosures, breeding cages, frog-tanks and aquariums. From the animal room supplies of animals and materials are obtained for the work in physiological chemistry and experimental physiology. The hygienic conditions of the room are carefully studied, with a view to maintaining the physiological and structural integrity of its animal occupants perfectly as possible.

The physiological laboratories are equipped with a full supply of apparatus, instruments, etc., for experimental purposes, including artificial respiratory machines, batteries, Du Bois Reymond coils, galvanometers, rheostats, Desprez signals, chronographs, moist muscle-chambers, kymographion, spring myographs, stethoscopes, phonendoscopes, stethometers, sphygmographs, cardiographs, sphygmometers, Gaskell's clamps, oncometers, oncographs, hemometers, hemocytometers, hematocrits, ergograph, plethysmograph and microscopes. Electric motor power is provided for driving apparatus.

The course in physiology is graded in the first and second years. Under the concentration system in vogue, something more than one-half of the student's time is occupied with this study during one semester of each of these years.

Each phase of the subject is treated as a unit: i. e., the laboratory courses in physiological chemistry, experimental physiology, physical chemistry, etc., are correlated and interwoven with the lecture courses throughout. The work is essentially practical and is individualized as much as possible.

In the first year, the student takes up the study, first, of the physiologic components of the animal body; next, the physiological and physical properties of tissue-cells in general; the nutritive media; and the neuromuscular mechanisms. He then enters upon the study of systematic physiology, taking, in turn, the circulation, digestion, secretion, respiration and excretion. Urinalysis is made a special feature of the work in physiological chemistry. The student is thoroughly drilled in the technique of analytical and estimative methods in the study of the body-fluids.

In the second year, the same methods are applied to the problems of metabolism and nutrition. The student makes a complete nutritive balance, based upon a series of actual feeding experiments, including the analysis

of a standard dietary, the qualitative and quantitative examination of the feces and urine, the estimation of the total and differential nitrogens and the determination of respiratory quotients.

In relation to the question of nutrition the distinctive physiologic conditions of successive ages of human life are discussed.

The last three-quarters of the year are occupied with the discussion and laboratory study of the physiology of the nervous system, special attention being paid to the observation and testing of special sense phenomena, cerebral localization, etc.

A laboratory reference library is accessible to the students for purposes of collateral reading.

COURSES OF STUDY (See p. 28).

First Year

1. **GENERAL CELLULAR PHYSIOLOGY** PROFESSORS BEARD AND WILCOX,
AND DR. SEDGWICK
Four and one-half credits (twelve lecture and recitations periods,
six laboratory periods) First quarter
The study of the physiologic components of the animal body; the
physiologic and physical properties of the tissue-cells in gen-
eral; the specializations of function; the nutritive media,
including methods of blood examination.
2. **THE MUSCULO-NERVOUS MECHANISMS** PROFESSORS BEARD AND WILCOX
Four and one-half credits (twelve lecture and recitation periods,
six laboratory periods) First quarter
The study of the phenomena of muscle and nerve action, including
the principles of nerve control in general. The student is
introduced in this course to the technique of experimental
study.
3. **SYSTEMATIC PHYSIOLOGY** PROFESSORS BEARD AND WILCOX, AND DR.
SEDGWICK
Four and one-half credits (twelve lecture and recitation periods,
six laboratory periods) Second quarter
The vascular mechanism, including the estimation of blood-
pressure, the mapping of cardiac areas, the study of heart
sounds, and the making of sphygmograms.
The digestive system, including the process of secretion, the
analysis of the digestive fluids, the examination of the normal
stomach contents and the conduct of digestions.
4. **SYSTEMIC PHYSIOLOGY (Continued)** PROFESSORS BEARD AND WILCOX,
AND DR. SEDGWICK
Four and one-half credits (twelve lecture and recitation periods,
six laboratory periods) Second quarter
The respiratory mechanism; the mechanics, physics, chemistry
and nerve control of respiration.
The excretory system, including the study of excretion by the
air-passages, the intestinal tract, the skin and the kid-
ney. Analysis of the physiological urine is addressed both to
the determination of functional facts and to the attainment of
the technique of clinical diagnosis in this field.

Second Year

5. **METABOLISM AND NUTRITION** PROFESSOR BEARD AND DR. SEDGWICK
Four and one-half credits (twelve lecture and recitation periods,
six laboratory periods) Third quarter
A study of metabolic and nutritional problems for the determina-
tion of nutritive balance, nitrogenous and body equilibrium, and
dietaries and the further examination of the normal stomach
contents and the faecal debris, the estimation of nitrogen ex-
cretion in total and in differential forms, the relation of fat
splitting and fat-absorption, and the determination of respira-
tory quotients, etc.
A study, also, of the distinctive physiologic features of fetal
and infantile life, of childhood, puberty, pregnancy, parturition,
the climacteric and old age.

6. **PHENOMENA OF STIMULATION** PROFESSORS BEARD AND WILCOX
 Four and one-half credits (twelve lecture and recitation periods,
 six laboratory periods) Third quarter
 A study of the conditions of stimulation, the nature of stimuli
 and their effects upon the nervous mechanism, including the
 phenomena of absence, section, and the reactions of degen-
 eration.
7. **PHYSIOLOGY OF SPECIAL SENSE ORGANS** PROFESSORS BEARD AND WILCOX
 Four and one-half credits (twelve lecture and recitation periods,
 six laboratory periods) Fourth quarter
 A study of special sense phenomena and of the means of de-
 termining the acuity of, and the influences which condition,
 special sense function in all its fields.
8. **THE PHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM** PROFESSORS
 BEARD AND WILCOX
 Four and one-half credits (twelve lecture and recitation periods,
 and six laboratory periods) Fourth quarter
 A study of the functions of the nervous system in general, in-
 cluding the functional relations of nerve tracts, association
 paths, and central localization.

Text-Books:

First and second years—

The American Text-Book of Physiology.

Howell's Text-Book of Physiology.

Foster's Physiology, Sixth English edition.

Hammarstein's Physiologic Chemistry.

Collateral Reading—Landols and Sterling's Handbook of Physi-
 ology; VanNoorden's Text-book of Metabolism; Stewart's
 Practical Physiology; Tigerstedt's Physiology; Blyth's Foods
 and their Composition; Hutchinson's Dietetics.

DEPARTMENT OF PATHOLOGY AND BACTERIOLOGY

FRANK F. WESBROOK, M.A., M.D., C.M., *Professor of Pathology and Bac-
 teriology*

S. MARX WHITE, B.S., M.D., *Associate Professor of Pathology and Bac-
 teriology*

H. W. HILL, M.D., *Assistant Professor of Bacteriology*

LOUIS B. WILSON, M.D., *Assistant Professor of Clinical Pathology*

J. FRANK CORBETT, B.S., M.D., *Assistant Professor of Surgical Pathology*

R. H. MULLIN, B.A., M.B., *Senior Demonstrator in Pathology and Bac-
 teriology*

H. E. ROBERTSON, A.B., M.D., *Demonstrator in Pathology*

CHELSEA C. PRATT, M.D., *Junior Demonstrator in Pathology and Bac-
 teriology*

J. L. ROTHROCK, A.M., M.D., *Clinical Instructor in Pathology*

ARTHUR S. HAMILTON, B.S., M.D., *Instructor in Pathology of the Nervous
 System*

Hospital Laboratory Assistants: Carl O. Estrem, B.A., M.D., and
 Tolbert Watson, A.B.

Departmental Laboratory Assistant: Lee Pollock

The Institute of Public Health and Pathology, to which attention has
 already been directed, provides adequate room and facilities for teaching and
 research in pathology, bacteriology, and public health.

The main laboratory, 56x75 feet, lighted on three sides and by a skylight, is used for the general or required courses. It is divided into twelve loges, each fully and independently equipped in every detail for the use of six students, who are responsible for all equipment therein contained. Supplies are distributed from a supply room opening off the main laboratory. Books and specimens required in teaching are easily procurable from the museum library, which is connected by a special or private passageway with the main laboratory. A combined lecture and autopsy room opens both from the main laboratory and from the hall so that autopsies, lantern demonstrations or lectures may be given during the period devoted to the laboratory exercises without interference with the practical work.

A smaller laboratory, one-half the size of the main laboratory, is provided for special work in graduate and optional courses in the diagnosis of tumors, pathology of the nervous system, practical public health, etc. The same loge arrangement obtains as in the main laboratory.

The hospitals of Minneapolis, St. Paul, Duluth, Rochester and St. Peter, Minn., in which members of the staff are working, afford a large supply of material and frequent opportunities for post-mortem examinations. From many institutions and physicians throughout the state, valuable and interesting gross and microscopic materials are received from time to time and are made available in the museum and for macroscopic and microscopic class use.

The State Board of Health laboratories for research and routine investigation are located in the institute as well as a Pasteur Institute for the study and treatment of rabies. This affords an abundance of illustrative material for public health, pathology, and bacteriology.

A full equipment of microscopes permits of the rental of an instrument to each student, if he is not provided with one suitable for his purpose.

METHODS OF INSTRUCTION

In this department the center around which all instruction is grouped is constituted by the student's own personal practical experience in the laboratories. This is supplemented and coordinated by lectures, laboratory and lantern demonstrations and recitations as required.

PROFESSOR HILL, DR. MULLIN AND DR. PRATT

(Twelve lecture and recitation hours and twelve laboratory hours per week)

Fourth quarter

Required of sophomores.

Lectures and demonstrations. The general scope of bacteriology, the history of its development and the biological and chemical problems involved in the life history of bacteria are dealt with.

1. GENERAL BACTERIOLOGY

PROFESSORS WESBROOK, ASSISTANT

PROFESSOR HILL, DR. MULLIN AND DR. PRATT

(Twelve lecture and recitation hours and twelve laboratory hours per week)

Fourth quarter

Required of sophomores.

Lectures and demonstrations. The general scope of bacteriology, the history of its development and the biological and chemical problems involved in the life history of bacteria are dealt with.

The classification of the various bacterial forms, the methods of isolation and culture and the composition and manufacture of culture media are studied until a thorough knowledge of technique is acquired. General and special study of the various antiseptics, disinfectants and bactericidal substances and conditions will be undertaken.

Laboratory work, involving the making of their own culture media by the students, the study of bacteria in cultures and under the microscope, technique of staining and other methods, including observations of chemical and biological peculiarities, is thoroughly carried out. Testing of various germicides, chemical and physical, and the use of bacteriological methods in the examination of drinking water form an important part of the work. Bacterial activities concerned in sewage purification, etc., receive attention.

2. GENERAL PATHOLOGY **PROFESSOR WESBROOK, DR. MULLIN, ASSOCIATE
PROFESSOR WHITE, DR. ROBERTSON, DR. PRATT**

Nine credits (twelve lecture and recitation hours, and twelve laboratory hours per week) **Fourth quarter**

Required of sophomores.

Lectures, demonstrations and laboratory work on the general processes involved in disease, which includes

- (a) Inflammation. The cell reaction to various irritants is carefully studied throughout a variety of tissues and animals so as to be comparative. As soon as familiarity with cell reaction is insured, the inflammatory processes in the various organs and systems are studied.
- (b) Regeneration not already dealt with under inflammation is illustrated by specimens especially prepared from experimental animals and clinical and autopsy material.
- (c) Inflammatory reactions and pathological processes dependent upon the activities of the circulatory system, including metastasis, thrombosis, embolism, infarction, etc., are systematically studied.
- (d) Degeneration. The theories as to causation and the chemical processes involved are presented on the basis afforded by experimental work, together with a large amount of illustrative clinical material.
- (e) The general physical, chemical and biological processes involved in immunity are presented together with practical and illustrative work on precipitins, agglutinins, opsonins, etc. The pathology of fever is also fully given.
- (f) The theories of causation, the general principles involved and classification of tumors are illustrated by a carefully selected assortment of the various types.

3. PATHOLOGY OF SPECIAL DISEASES (includes Bacteriology)

**PROFESSOR WESBROOK, ASSOCIATE PROFESSOR
WHITE, DR. MULLIN, DR. ROBERTSON AND DR. PRATT**

Ten credits (four lecture or recitation hours and twelve laboratory hours per week, eighteen weeks) **First semester**

Required of juniors.

Disease processes will be grouped, so far as practicable, according to their etiology. Instruction will be afforded by means of lectures, demonstrations of museum specimens and preparations, and laboratory work on materials secured from clinical cases and at autopsy.

The course will consist of instruction in

1. Pathology of infectious diseases.
 - (a) Special bacteriology of the infectious diseases with the cultivation on the various media of all the important pathogenic bacteria, sown and kept under observation by each student. Fluids and tissues from clinical cases and autopsies (human and animal) will be supplied for microscopic and cultural examination and an intimate relationship with clinical pathological work maintained.
 - (b) Special pathology of the infectious diseases. Concurrently with the bacteriology and parasitology of each of the diseases, the pathology of each infection will be studied.
- The important gross and microscopic lesions in all the organs will be illustrated from clinical and autopsy material, fresh and preserved, and supplemented by experimental work. Each student will be required to prepare and examine under the microscope selected fresh and stained specimens of morbid tissues, fluids, etc.
2. Pathology of toxic and obscure origin. Under this are included the special degenerations, inflammations and other pathological conditions not already included under infectious diseases.

4. AUTOPSIES AND POST-MORTEM TECHNIQUE **ASSOCIATE PROFESSOR WHITE
DR. ROTHROCK, DR. MULLIN, DR. ROBERTSON AND DR. PRATT**

Students will have an opportunity of personally taking part in this work, under the direction of the pathologists in charge, in the hospitals of Minneapolis and St. Paul. A knowledge of

the technique of post-mortem work and of morbid anatomy will be thus afforded. Throughout the third and fourth years.

5. **SPECIAL PATHOLOGY OF THE NERVOUS SYSTEM** DR. HAMILTON AND DR. ROBERTS
Two credits (twelve hours per week, first four weeks) Second semester

Required of juniors.

So far as possible, the clinical history, autopsy notes, gross specimens and sections stained by various special methods will be presented of individual cases representing the principal organic diseases of the nervous system.

6. **PRACTICAL PATHOLOGY OF TUMORS** ASSOCIATE PROFESSOR WHITE AND DR. R. H. MULL
(Twelve hours per week, four weeks) Second semester

(Elective for a limited number of students in fourth year.)
Laboratory course on the microscopic study and diagnosis of tumors.

This course includes the comprehensive study of tumors, with the view of giving the student a knowledge of the methods employed in the laboratory diagnosis of this class of pathological conditions and familiarizing him with the characters of the commoner as well as the rarer types, special attention, however, being given to the latter. It is intended to supplement the course on the surgical pathology of tumors by Professor Stewart.

7. **RESEARCH WORK IN ONE OF THE FOLLOWING LINES:** Second semester of third and throughout the fourth year, hours assigned.
(a) General pathology.
(b) Special pathology and bacteriology and technique.

8. **SURGICAL PATHOLOGY** PROFESSOR STEWART
(Two hours lecture and one hour recitation a week, first semester third year, and two hours per week, second semester, fourth year.)
(See Principles of Surgery and Tumors.) This course will consist of lectures and laboratory demonstrations and will cover the general subject of the pathological and bacteriological basis of surgery. The lectures will be illustrated by charts and diagrams, by fresh and preserved specimens, and, so far as practicable, demonstrations will be given of the various processes of the bacteria concerned. Especial attention will be given to inflammation and its complications to the infectious diseases of surgical importance and to tumors.

PATHOLOGICAL SOCIETY

The medical men of the State who are especially interested and are actually working in pathology and bacteriology formed a society in the autumn of 1901, which meets monthly from October to June, in the laboratories of the department. Papers embodying original work with illustrative specimens are presented at each meeting and once a year the society invites a special guest of honor to give an address in pathology or some allied subject.

TEXT-BOOKS:

Pathology—

Delafield and Prudden's Handbook of Pathological Anatomy and Histology.

American Text-Book of Pathology.

Ziegler's General and Special Pathology.

Schmaus-Ewing: Pathology and Pathological Anatomy.

Coplin's Manual of Pathology.

Cattell's Post-Mortem Pathology.

Durck-Hektoen: Special Pathologic Histology.

Jakob: Nervous System.

Mallory and Wright's Pathological Technique.

Collateral Reading—Hamilton's Text-Book of Pathology; Woodhead's Practical Pathology; von Kahliden's u Anatomie; Orth, Histology; Thoma's Text-Book of General Pathology; Lubarch Ostertag, Ergebnisse der Pathologie u Anatomie; Orth,

Pathologische Anatomie; Birch-Hirschfeld, Pathologische Anatomie; Osler's System of Medicine; Clifford Allbutt's System of Medicine; Leukhart's die Thierische Parasiten des Menschen; Bouchard, Traite de Pathologie Generale; Eichorst, Pathologie du Therapie; Gaylord and Aschoff, Pathological Histology; Nothnagel, Encyclopedia of Practical Medicine; Wood, Chemical and Microscopical Diagnosis.

Surgical Pathology—

Bland-Sutton, Tumors. Innocent and Malignant.

Lexer's Handbook of Surgery.

DEPARTMENT OF MATERIA MEDICA AND THERAPEUTICS

WILLIAM EDWIN LEONARD, A. B., M.D., *Senior Professor*

H. O. SKINNER, M.D., *Lecturer on Pharmacology*

ADOLPH W. JOHNSON, *Lecturer on Pharmacy*

The work of this, the essential chair in the College curriculum, is arranged so that the student is gradually led up from the elementary work of the first and second years to the fuller instruction of the third and fourth, when his more complete knowledge of general and special branches enables him to understand the intimate relation of therapeutics to the whole and especially to pathology and the clinical pictures of disease.

1. PHARMACY

One credit (one hour per week)

Open to third year students.

Mr. Johnson will lecture upon the peculiar methods of Homeopathic Pharmacy, personally instructing each student in the technique of the more common preparations, and in writing and filling prescriptions, using for these purposes the material and apparatus in Prof. Leonard's laboratory, which is abundantly supplied with the crude and perfected drugs for illustration and demonstration.

MR. JOHNSON

First semester

2. PHARMACOLOGY

Two credits (one hour per week)

Open to fourth year students.

Two hours each week in lectures and quizzes, the toxicological and physiological action of a few typical drugs will be studied especial reference being had to the difference in the action of small and large doses, the alkaloids, etc., with the idea of thus laying a broad foundation for the comprehension of the symptomatology of the latter years.

When practicable, actual experiments in the effects of drugs upon individual members of the class will be made, thus giving personal training in observation, the blanks and methods used being those authorized by the American Institute of Homeopathy, and under Professor Leonard's supervision.

DR. SKINNER

Second semester

3. MATERIA MEDICA

Four credits (two hours per week)

Open to fifth year students.

Routine lectures and quizzes, three hours each week, will be given upon the Vegetable Remedies, some thirty major and seventy-five minor drugs, arranged according to their natural groups and their clinical relationships to disease, and studied in their origin, history, preparation, physiology and symptomatology, full practical comparisons being made with other allied remedies only such usage being presented as has been fully corroborated.

PROFESSOR LEONARD

4. MATERIA MEDICA

Four credits (two hours per week)

Open to sixth year students.

The animal, mineral and nosological remedies of the materia medica, some forty major and twenty minor drugs grouped and studied as these of the previous year, will be taken up.

PROFESSOR LEONARD

The College of Homeopathic Medicine and Surgery

special attention being given to the usage of this class in chronic as well as acute disease.

Examinations will be held from time to time, or at the end of the term, in the form of written quizzes, the students final standing being made up of these and his daily quiz records.

COLLATERAL READING:

First Year—Pharmacopea of the American Institute of Homeopathy

Second Year—Hughes' Pharmacodynamics.

Third and Fourth Years—Farrington's, Hering's Condensed, or C. B. Parke's Materia Medica; Dunham's Lectures upon Materia Medica, Allen's Hand-Book.

DEPARTMENT OF PRACTICE OF MEDICINE, CLINICAL

MEDICINE AND PHYSICAL DIAGNOSIS

H. M. LUFKIN, M. D., *Professor*

ASA H. HAMMOND, M. D., *Professor*

O. H. HALL, M. D., *Professor*

ANNA M. HURD, Phm. D., M. D., *Associate Professor*

H. O. SKINNER, M. D., *Assistant*

A. E. AHRENS, M. D., *Assistant*

G. B. HAMLIN, M. D., *Assistant*

O. K. RICHARDSON, A. B., M. D., *Assistant*

PRACTICE OF MEDICINE

PROFESSOR LUFKIN

Twelve credits (three hours per week)

This course of lectures occupies three hours a week throughout the junior and senior years; the object aimed at is to acquaint the student with the pathological basis of the various diseases, their symptomatic course and the findings derived from the various methods of physical macro- and microscopical examinations, so that with the complete picture of its diseased process and its possibilities, he may intelligently apply all known methods of relief, hydro-therapy, electrical reaction, dietetics, physiological and palliative medication, and above all may scientifically select the homeopathic remedy curative of the diseased process as conditioned by the peculiar susceptibility and idiosyncrasy of the individual to be treated.

TEXT-BOOKS AND COLLATERAL READING

PRACTICE OF MEDICINE:

Goodno's Practice.

Raue's Therapeutics.

Lippe's Repertory.

Knerr's Repertory.

Pepper's System of Medicine.

DaCosta's Diagnosis.

Ander's Practice of Medicine.

2. BLOOD AND DUCTLESS GLANDS

PROFESSOR ANNA HURD

One-half credit (one hour per week)

One quarter

A course of nine didactic lectures on the blood and ductless glands is delivered each year to the senior students.

3. RENAL DISEASES

PROFESSOR H. O. SKINNER

One-half credit (one hour per week)

One quarter

A course of didactic lectures on renal diseases is delivered each year to the senior students.

CLINICAL MEDICINE

Abundant material is furnished by the daily clinics at the University free dispensary and at the Hospitals of St. Paul and Minneapolis where clinics are held each Monday and Tuesday morning.

This course is one of the most important to the student, for it is here that he sees the practical application of not only his didactic course on physical diagnosis, but also the subject of internal medicine and diagnosis or practice is fully illustrated by the ambulatory or clinical patient, as well as by the hospital patient.

Professor Lufkin conducts a clinical lecture each Saturday afternoon from one to three. One hour is devoted to examination of patients, one or two cases being selected for special instruction the following hour.

The important field of homeopathic prescribing (therapeutics) is fully illustrated. All forms of acute and chronic diseases come up for demonstration during the year.

PHYSICAL DIAGNOSIS

PROFESSOR HAMMOND

One-half credit (one hour per week)

Twenty-seven weeks

The course on physical diagnosis is embraced in twenty-seven didactic lectures, and teaches the methods of investigating both the normal and abnormal sounds, feeling and appearance of the the human subject. The lectures are divided into an introductory portion dealing with the general technique of physical examinations followed by the special methods of investigating the normal and abnormal heart and lungs, the abdominal organs, the stomach, liver and kidneys.

These lectures are supplemented for the junior student, by especial exercises in the dispensary, where abundant material is at hand for putting such methods as are taught in the didactic course, to practical application upon the living subject.

Physical Diagnosis, Clinical Medicine.

Lillenthal's Therapeutics.

Lippe's Reperatory.

Farrington's Clinical Materia Medica.

Vierordt's Medical Diagnosis.

Abram's Manual of Clinical Diagnosis.

DeCosta's Diagnosis.

DEPARTMENT OF SURGERY

R. D. MATCHAN, M. D., *Senior Professor*W. S. BRIGGS, B. S., M. D., *Professor*A. F. COMSTOCK, M. Sc., M. D., *Professor*W. B. ROBERTS, A. B., M. D., *Professor*A. E. BOOTH, A. B., M. D., *Professor, Orthopaedia*A. E. AHRENS, M. D., *Assistant*C. A. DAWSON, M. D., *Assistant*

SURGERY

The course in surgery is so graded to extend through sophomore, junior, and senior years. It consists of didactic lectures, clinical demonstration and actual work by the students of the senior and junior classes, as they are given one month's work each or more in dispensary clinics every day under charge of attending professor, and are held responsible by him for all emergencies and dressings. They also give all anesthetics and attend to the post operative treatment. These advantages given our students cannot be excelled, and gives each member that opportunity of gaining for himself that valued knowledge and confidence which comes only by actual experience.

1. SURGICAL ANATOMY

PROFESSOR BOOTH

One credit (one hour per week)

First semester

The instruction consists of dissections, demonstrating the relations of structures composing the surgical regions of the body: demonstrations, upon the living subject, showing the an-

The College of Homoeopathic Medicine and Surgery

atomical and surgical landmarks and their applications; also the location, by surface tracings, of the viscera contained in the various cavities and of the important arteries, veins and nerves.

2. EMERGENCIES AND BANDAGING

PROFESSOR B

One credit (one hour per week)

First sem

A course of lectures on surgical emergencies and bandaging is given the students of the sophomore or fourth year in consideration of the means in administering first aid to the injured, also laboratory instructions of how to apply dressings, bandages, splints and the materials used.

3. PRINCIPLES OF SURGERY

PROFESSOR RO

One and one-half credit (one hour a week)

Twenty-seven v

A course of lectures upon inflammation; traumatic fevers, suppurations; acute inflammations of joints; ulceration, gangrene; thrombosis and embolism; septicemia; pyaemia; erysipelas; tetanus; surgical tuberculosis; actinomycosis, anthrax and glanders.

4. TUMORS

PROFESSOR RO

One credit (two hours per week)

Nine v

A special course upon tumors, taking up the general pathology and the general principles of the treatment of tumors. Each variety of tumor is then discussed, together with its histology, life-history, diagnosis and treatment. The course is illustrated by charts and museum specimens and lantern slide demonstrations.

5. GENERAL AND SPECIAL SURGERY

PROFESSOR COMS

Eight credits (two hours per week)

Two

The juniors and seniors or fifth or sixth year are given two lectures each week on general and special surgery, during the entire two years, covering all the surgical diseases, and special technique in operative surgery, especial attention being paid to pathology, diagnosis and treatment of each disease from a surgical standpoint in conjunction with the valued homeopathic application of remedies.

6. SURGERY OF VASCULAR SYSTEM, ETC.

PROFESSOR MATO

One credit (one hour per week)

First sem

A course of lectures on the surgery of the vascular system: ligations, etc. Fractures and dislocations, amputations and the surgery of the nerves.

7. OPERATIVE SURGERY

PROFESSOR MATO

One credit (one hour per week)

First sem

During the senior or sixth year, the class will be instructed in the surgical laboratory in operations in the cadaver, in which the student is called upon to do the work under the special criticism of the professor in charge, thus perfecting themselves by actual practice with operations they will be called upon to perform in later years.

CLINICAL SURGERY

The work in clinical surgery consists in operations before the in connection with the clinical lectures given upon the cases presented. occupy each Monday of the fourth year which is set apart as the day clinics. The third year class is required to attend the clinics, unless regular class work interferes.

At the clinics which are held at the City and County Hospital, St. L and St. Joseph's Hospitals, of St. Paul, and the City Hospital and Free pensary, Minneapolis, are demonstrated the value of antiseptic treatment wounds, the minute details of the application of surgical appliances dressings and operative technique. Post-operative care for reaction, s etc., are considered.

Senior students are instructed in the practical use of anaesthetics are required to attend a number of surgical patients at their homes, carry out post-operative detail under the direction of the professor.

The surgical department aims to give a complete and thorough course of the subject and its collateral branches.

It should be distinctly understood that examinations on the clinical and laboratory work, both sectional and at the end of the term, no matter to whom the teaching is done, are counted with the didactic course, the average of all combined constituting the student's standing in surgery for each year. The marks for the four years go to make up his graduation average.

TEXT-BOOKS

Park's Surgery.

Treene's Operative Surgery.

Wyeth's General and Operative Surgery.

Surgical Technique, by Von Eschmarch and Kowalzig.

DIDACTIC COURSE

The didactic course covers the entire field of the principles and practice of surgery. The lectures will occupy the third year class two hours and the fourth year class three hours each week. Demonstrations will be made upon the cadaver, aided by models and charts.

The lectures to the third class will include surgical pathology, inflammation, hemorrhage, surgical appliances, surgical emergencies, minor surgical operations, ligation of arteries, burns and scalds, surgical treatment of the anus and rectum, antiseptics, anæsthetics, abscesses, ulcers, gangrene, hernia and the elements of the treatment of wounds, fractures, dislocations and amputation.

The lectures of the fourth year class will include the surgery of the bones, joints, genito-urinary organs, tumors, cysts, fractures, dislocations, amputations, syphilis, together with the operative surgery of the head, face, chest, abdomen, pelvis, skin, nerves, and extremities.

All the lectures will aim to be comprehensive, practical, and in keeping with the best standards of advanced surgery.

TEXT-BOOKS, DIDACTIC COURSE

Parke's Surgery.

Homeopathic Text-Book of Surgery.

Hamline's American Text-Book of Surgery.

Bradford & Lovett's Orthopædic Surgery.

Pye's Surgical Handicraft.

Modern Surgery, J. C. DeCosta.

ORTHOPAEDIA

PROFESSOR BOOTH
One year

Two credits (one hour per week)

The course on this subject is both didactic and clinical. It consists of one lecture a week during the fourth year.

The whole subject of deformities, their etiology, pathology, course and treatment is carefully considered in detail. Charts and drawings are used to illustrate the work. The mechanical apparatus used in the treatment of such cases is exhibited and rules laid down for the improvising and applying temporary means and instruments. Recent progress in the knowledge of the underlying causes of bony, muscular and habit deformities and their serious reflex effects, has led to great changes in the methods pursued to overcome them. The early recognition and treatment of such cases are of the utmost importance, and, hence, as they are usually first presented to the general practitioner, a full knowledge of this branch of surgery becomes exceedingly valuable. In the dispensary clinics the student sees carried out the teachings of the didactic course.

The subjects discussed include functional and organic diseases of the bony spine, the several forms of club foot, joint inflammations and deformities, both simple and tuberculous and their sequellae, cleft-palate, hare-lip, etc.

DEPARTMENT OF OBSTETRICS.

B. H. OGDEN, A. M., M. D., *Senior Professor*HUGH J. TUNSTEAD, M. D., *Professor*

OBSTETRICS

This subject is taught by lectures and recitations, thoroughly illustrated with charts, manikins and specimens. The course will be graded and divided between the fifth and sixth years.

1. FIFTH YEAR OBSTETRICS

PROFESSOR TUNSTEAD

One and one-half credits (one hour per week)

Twenty-seven weeks

During the fifth year subjects covered will embrace the anatomy and physiology of the female generative organs and the pelvis, the development of the embryo, the maternal changes of pregnancy, the diagnosis of pregnancy, the physiology, pathology and hygiene of pregnancy, the physiology and the course of normal labor, the physiology of normal labor and the management of the puerperium.

2. SIXTH YEAR OBSTETRICS

PROFESSOR OGDEN

Two credits (one hour per week)

One year

During the sixth year the following subjects are taught; the mechanism of labor, diagnosis and management of the various presentations, dystocia, complications of labor, physiology, pathology and the management of the puerperium, and obstetric surgery.

CLINICAL OBSTETRICS

This department instructs the fourth year students and applies practically the teachings of the department of obstetrics. An abundance of material is supplied by the dispensary and city hospitals of St. Paul and Minneapolis.

The student will be thoroughly educated to locate accurately the position and condition of the internal parts both in health and disease, the obstetric points of the pelvis as well as the diameters, planes and curves, the presentation and position of the child and the methods of diagnosis, the stages and mechanism of labor, the management of normal and abnormal labors, the application of the forceps and the necessary steps in performing version.

Each member of the class will be assigned at least three cases of pregnancy, which he will be required to attend under immediate direction of the professor of the chair.

During the last month of pregnancy of a case as assigned, the student in charge will report to the professor the patient's name, address, age, number of previous labors, date of first birth and last labors, date of quickening, condition of uterus, heart, lungs, bowels, kidneys, etc., and a detailed statement regarding the appearance of the patient, location of the foetal heart, position of the child, character and size of the pelvis.

At the time of labor the student will be required to keep a record of the following facts:

Number of the case, date, name, address, condition of the osuteris, height of presenting part, pulse rate and quality (ante and post partum), rapidity of foetal heart beats and where heard most clearly, presentations, position and duration of the first, second and third stage.

Also the sex of the child, the diameter of its head, weight, and length. The post partum condition of the uterus, cervix and perineum.

An operative course on the female cadaver will also be given, demonstrating the operative technique in symphysiotomy and Cæsarean section.

TEXT-BOOKS AND COLLATERAL READINGS

Leavitt.

Lusk's Midwifery.

American Text-Book of Obstetrics.

Hirst's Text-Book of Obstetrics.

Grandin & Jarman's Midwifery.

Playfair's Midwifery.

Boisliniere, Obstetric Accidents.

Davis' Obstetrics.

DEPARTMENT OF DISEASES OF WOMEN

R. R. ROME, M. D., *Senior Professor*E. E. AUSTIN, M. D., *Professor*H. C. ALDRICH, M. D., *Professor*S. G. COBB, M. D., *Associate*

DISEASES OF WOMEN

This course will consist of one didactic lecture during the fifth and six years and two clinics a week during the sixth year.

1. FIFTH YEAR DISEASES OF WOMEN PROFESSOR ALDRICH
 One and one-half credits (one hour per week) Twenty-seven weeks
 In the fifth year, both semesters, the anatomy, physiology and pathology of the pelvic contents and perineum are carefully described. The preparation of the patient for surgical operation, together with the necessary steps taken, the various surgical procedure as well as the medical treatment of all pelvic diseases, will receive minute attention both semesters of the fourth year.
2. FIFTH YEAR DISEASES OF WOMEN PROFESSOR AUSTIN
 One-half credit (one hour per week) One-half semester
 This course treats of tumors of the uterus and annexæ.
3. SIXTH YEAR DISEASES OF WOMEN PROFESSOR ROME
 One credit (one hour per week) First semester
 The medical and surgical diseases of women will be treated in didactic lectures and recitations. The entire field of gynecology will be covered in the lecture room. As cases present themselves in the city hospitals of St. Paul and Minneapolis, the subject thus described will be demonstrated on the living subjects.

Gynecology.

Wood, Text-Book of Gynecology.

DEPARTMENT OF MENTAL AND NERVOUS DISEASES

- PROFESSOR LUFKIN AND DR. WELSH
- One credit (one hour per week) First semester
 The didactic and clinical work on nervous diseases is obtained from the department of practice and clinical medicine. the
 The didactic and practical work in mental diseases is obtained at Fergus Falls Insane Hospital, each senior student spends two weeks at asylum in practical work among the insane. the
 Talcott's Mental Diseases.
 Clouston's Mental Diseases.
 Edinger's Anatomy of Central Nervous System.
 Martin's Nervous Diseases.
 Dana Text-Book Nervous Diseases.
 Bigelow's System of Electro-Therapeutics.
 Oppenheim's Diseases of the Nervous System.
 Collateral Reading—Hack Tuke's Dictionary of Psychological Medicine;
 Bevan Lewis, Mental Diseases; Kirchoff's Handbook of Insanity; Ferrier's Localization of Cerebral Diseases; Strumpell's Text-Book of Medicine; Hirt's Diseases of the Nervous System; Horsley's Brain and Spinal Cord.

DEPARTMENT OF DISEASES OF CHILDREN

- PROFESSOR HAMLIN
- One credit (one hour per week) First semester
 The course on this subject will consist of one lecture each week and three clinics to the sixth year students, and extending over two semesters. The clinics are full and afford an exceptional opportunity to study the common-
com-

mon diseases of childhood. In the out door department many cases of exanthematous diseases are treated by the members of the class.

The didactic course embraces a description of the normal development of infancy and childhood, natural and artificial infant feeding, signs and symptoms of hereditary syphilis, contagious and infectious diseases, tuberculosis, erysipelas, and the diseases of the respiratory and urinary organs; those of the circulatory, nervous and digestive systems, rhachitis and diseases of the skin.

TEXT-BOOKS AND COLLATERAL READING

Tooker's Diseases of Children.

Holt's Diseases of Children.

Fisher's American Text-Book of Diseases of Children.

Collateral reading—Cyclopedia of Diseases of Children.

DEPARTMENT OF ELECTRO-THERAPEUTICS

ELECTRO-THERAPEUTICS

One credit (one hour per week)

ASSISTANT PROFESSOR HURD

One semester

It is intended to make the didactic work in this department commensurate with its growing importance. The physics of electricity will be sufficiently considered to enable the student to understand the mechanical construction, and the currents emanating from the galvanic and faradic batteries, the static machine X-Ray coil, the Oudin Resinator, as well as other apparatus used for the production of high frequency currents.

The technique of the various modalities with their physiological effects and the pathological conditions to which they are applicable are carefully and practically demonstrated.

Light energy will be considered in the same manner and demonstrated with the therapeutic arc light.

Books for reference:

Electro-Therapeutic Practice, C. S. Neiswanger, M. D.

Elements of General Radio-Therapeutics, Dr. Leopold Freund.

The Roentgen Ray in Medicine and Surgery, F. H. Williams, M. D.

DEPARTMENT OF OPHTHALMOLOGY

OPHTHALMOLOGY

Two credits (one hour per week)

PROFESSOR LEAVITT

One year

In the department of ophthalmology the endeavor is to give thorough instruction in those parts of the work which will ordinarily come into the hands of the general practitioner.

The course is supplemented by as much practical work as time allows in the use of the ophthalmoscope for the study of intraocular troubles, whose recognition would aid in the diagnosis of various conditional affections; and following a short didactic course given early in the year on the subject, practical work in the correction of the refraction is carried on at the dispensary during both semesters.

The clinical material provided in the department is very abundant, interesting and instructive cases, embracing all varieties of eye troubles calling for medical and surgical aid being presented to the students bi-weekly throughout the entire year.

The following schedule shows the subjects considered in the present course of lectures:

Anatomy and physiology of the eye; refractions and use of the lenses for the correction of its errors; diseases of the lids; conjunctiva; cornea; sclera; lachrymal apparatus; iris and ciliary body; lens choroid; retina and optic nerve; affections of the muscular apparatus of the eye and the general relationship between eye-strain and reflex and nervous disorders.

The didactic course consists of thirty-two lectures during the fourth year and ten during the third year.

Ophthalmology.

Norton, Buffum, Swanzy, Noyes.

Collateral reading—Fuch's Diseases of the Eye.

DEPARTMENT OF OTOTOLOGY, RHINOLOGY AND LARYNGOLOGY

EUGENE L. MANN, A. B., M. D., *Professor*

GEO. M. HAYWOOD, M. D., *Clinical Professor*

DISEASES OF THE NOSE, THROAT AND EAR

DISEASES OF THE NOSE, THROAT AND EAR

PROFESSOR MANN

One credit (one hour per week)

One year

The course will consist of didactic lectures and clinical demonstrations.

One didactic lecture a week will be given to students of the third year. An understanding of the anatomy and physiology of the organs is presupposed, and but little time will be devoted to the review of the more important points in their bearing upon diseases of these organs. The lectures will enter upon the diseased processes in the nose—the various forms of acute and chronic catarrhal inflammation, their courses, developments, symptoms, consequences and treatment, both general and local, abnormal growth, affections of the septum and diseases of the accessory sinuses, finishing the course on the nasal cavities with the neuroses, functional and organic.

The diseases of the naso-pharynx are treated with special reference to their dependence upon nasal conditions and their influence upon the organ of hearing. The course includes acute and chronic catarrhal processes, adenoid vegetations and morbid growth.

Diseases of the pharynx are considered in their dependence upon alimentary disorders, acute and chronic inflammatory conditions, morbid growths and neurosis, together with the pharyngeal and tonsillar conditions incident to the exanthamata, diphtheria, typhoid fever, etc.

In the laryngeal disorders we become more closely associated with respiratory diseases; the various forms of laryngeal inflammation, morbid growths and nervous affections will be discussed—especial stress being put upon the early laryngeal manifestations of tuberculosis and the laryngeal disorders of voice users with the importance of proper vocalization and respiration upon all diseases of this organ.

Ear diseases resolve themselves into: Diseases of external canal and pinna, dermoid inflammation; diseases of the middle ear, mucoid inflammation, diseases of the internal ear—serous and nerve inflammation.

The course to the fourth year students will be entirely clinical, the class being divided into sections for dispensary work; the aim will be to familiarize the students with the use of the various diagnostic means at their disposal and the appearance of the various abnormal conditions, together with the technique of the numerous operative procedures. The material for clinical demonstrations is abundant.

Ear: Barr.

Nose and Throats: Kyle, Bosworth, Ivins, McDonald.

Nose, Throat and Ear: Veshlaget & Hallett; McBride, Burnett.

DEPARTMENT OF SKIN AND GENITO-URINARY DISEASES

SKIN AND GENITO-URINARY DISEASES

PROFESSOR NEILL

One credit (one hour per week)

One semester

This course will consist of one didactic lecture and one clinic each week for students of the fourth year. It will include the diseases of the skin, syphilis and all genito-urinary affections.

The first semester will be devoted to a study of the diseases of the skin, the second to syphilis and venereal surgery. The dispensary clinics will be especially valuable in supplementing the work of the professor in the lecture room by familiarizing students with the appearance of the various forms of skin and venereal diseases. Each student is required to diagnose cases and treat patients under the supervision of the professor, thus giving him actual experience in administering remedies and using instruments. During the course of the year each student has personal charge of about fifty patients in this department.

TEXT AND REFERENCE BOOKS

Dermatology: Kippax, Stelwagon, Durhring, Dearborn.

Genito-Urinary: Carlton, Hoyne, Franklin, American Text-Book, Bumstead and Taylor.

MEDICAL ECONOMICS

MEDICAL ECONOMICS

(One hour per week)

PROFESSOR RICHARDSON

One semester

The lecture course on this subject will embrace all that pertains to the social and business side of the practice of medicine.

Under the social head will be treated: The manner of meeting patients in their homes and at the office; a physician's standing in the social community in which he lives, in fact, the doctor's deportment toward the laity.

Under the business head will be treated: The choosing of a location for practice, the location of a home and office in the community, the bookkeeping and collection of accounts.

Lectures will also be given on the advantages of and necessity for organization of medical men.

The code of medical ethics will be explained fully and the reasons given for its existence.

DEPARTMENT OF HISTORY AND METHODOLOGY OF MEDICINE

HISTORY AND METHODOLOGY OF MEDICINE

(One hour per week)

PROFESSOR HALL

One semester

The lectures given in this chair are an exposition of the philosophy and art of medicine by the historical method. The student is taught to see how in each age practice of medicine has been the outgrowth of the beliefs current regarding the nature of man. Give to a student the theories held by a people regarding the constitution of matter, the nature of mind and force, and he can accurately foresee the medical science such as people will accept. The unfolding of the world's thought in medicine sets homeopathy in its high place and gives the student an outlook much needed in the profession. The tendency of medicine has always been to over-estimate the material side of man's nature and to make innumerable hypotheses to explain disease. The conflicts in medicine have been clashing, not of opposite sects, but of antagonistic systems of thought, and reconciliation is possible only on the grounds of higher science than that of mere sense knowledge. This ground is revealed in the history of the philosophy of medicine.

The course includes the medicine of the Egyptians, Persians, Indo-Chinese, Hebrews, Greeks, Arabians and of Europe down to the present.

One lesson each week during the freshman year.

DEPARTMENT OF MEDICAL JURISPRUDENCE

MEDICAL JURISPRUDENCE

One-half credit (one hour per week)

MR. SELOVER

One-half semester

The object of this chair is to familiarize the student with his duties, rights and responsibilities from a legal standpoint. The law on each subject discussed is carefully explained and illustrated, as far as possible, with adjudicated cases.

THE COLLEGE OF DENTISTRY

The College of Dentistry

FACULTY.

CYRUS NORTHROP, LL.D., *President*

ALFRED OWRE, D.M.D., M.D., C.M., *Dean, Professor of Operative Dentistry and Dental Metallurgy*

RICHARD O. BEARD, M.D., *Professor of Physiology*

CHARLES A. ERDMANN, M.D., *Professor of Anatomy*

GEORGE B. FRANKFORTER, M.A., Ph.D., *Professor of Chemistry*

THOMAS B. HARTZELL, M.D., D.M.D., *Professor of Clinical Therapeutics and Oral Surgery*

THOMAS G. LEE, B.S., M.D., *Professor of Histology and Embryology*

F. W. SPRINGER, E.E., *Professor of Electrical Engineering*

JAMES M. WALLS, D.M.D., *Professor of Clinical Operative Dentistry*

OSCAR A. WEISS, D.M.D., *Professor of Prosthetic Dentistry and Orthodontia*

JAMES O. WELLS, A.M., D.M.D., *Professor of Crown and Bridge*

FRANK F. WESBROOK, M.A., M.D., *Professor of Pathology and Bacteriology*

IRA HARRIS DERBY, B.S., *Assistant Professor of Chemistry*

ARTHUR W. MEYER, A.B., M.D., *Assistant Professor of Anatomy*

WINFIELD S. NICKERSON, Sc.D., M.D., *Assistant Professor of Physiology and Embryology*

M. R. WILCOX, M.D., *Assistant Professor of Physiology*

NORMAN J. COX B.S., D.M.D., *Instructor in Operative Dentistry*

G. M. DAMON, D. D. S., *Instructor in Prosthetic Dentistry and Anatomy*

H. S. GODFREY, D.M.D., *Instructor in Operative Dentistry*

R. L. GREEN, D.D.S., *Instructor in Operative Dentistry*

J. A. HANDY, Ph.C., *Instructor in Chemistry.*

EARLE R. HARE, B.S., M.D., *Instructor in Anatomy*

MARY V. HARTZELL, D.M.D., *Instructor in Comparative Dental*

U. E. HEDDY, D.D.S., *Instructor in Operative Technics*

E. E. HEMINGWAY, Ph.D., *Assistant in Anatomy*

W. F. LASBY, B.S., D.D.S., *Instructor in Technics*

J. F. LEMSTROM, M.D., *Instructor in Histology and Embryology*

HERMAN A. MAVES, D.D.S., *Instructor in Operative Dentistry*

R. H. MULLIN, B. A., M.B., *Senior Demonstrator in Pathology and Bacteriology*

OSCAR OWRE, M.D., *Instructor in Oral Surgery*

JAY N. PIKE, D.D.S., *Instructor in Prosthetic Dentistry Orthodontia and Dental Anatomy*

C. C. PRATT, M.D., *Demonstrator in Pathology and Bacteriology*

H. M. REID, D.D.S., *Instructor in Prosthetic Dentistry*

H. E. ROBERTSON, A. B., M.D., *Demonstrator in Pathology*

J. F. SCHEFCIK, B.S., Ph.G., M.D., C.M., *Instructor in Materia Medica*

J. P. SEDGWICK, B.S., M.D., *Instructor in Physiological Chemistry*

C. C. TYRELL, B.A., M.D., *Prosector of Anatomy*

ANDREW J. WEISS, *Instructor in Technics*

AMOS S. WELLS, B.A., D.D.S., *Instructor in Crown and Bridge-Work*

FRANK R. WRIGHT, D.D.S., M.D., *Instructor in Anæsthesia and Oral Surgery*

FRED S. YAEGER, D.D.S., *Instructor in Crown and Bridge-Work*

MRS. M. C. CLYDE, *Professional Nurse*

MISS H. E. COOKE, *Professional Nurse*

A. L. MOORE, *Infirmity Clerk*

General Information, Rules and Regulations

The College of Dentistry of the University of Minnesota is a member of the National Association of Dental Faculties, and its diplomas are recognized by the Dental Examining Boards of every state.

The regular course covers a period of three years of collegiate study, each year representing nine months in actual attendance.

The University now offers an optional six year course of study. The first three years of the course are given in the College of Science, Literature and the Arts. The last three years are given in the College of Dentistry. It leads to the bachelor's degree at end of the first four years and to the degree of doctor of dental surgery at the end of the six year course.

For schedule of lectures, announcements, changes in college rules, etc., see bulletin board.

Rules and regulations of the infirmary and laboratories are posted in their respective places.

MATRICULATION AND REGISTRATION

After matriculating with the registrar of the University and paying the regular fees, students will be assigned seats, benches and lockers in the order of their registration with the dean of the college.

Students shall have their registration completed not later than the day previous to the day set for regular work to begin.

No one is recognized as a student of the school or admitted to classes, until his receipts are presented to and countersigned by the dean; this applies to both semesters.

Students shall have their registration completed not later than the day previous to the day set for regular work to begin.

REQUIREMENTS FOR ADMISSION

Graduates of the following courses, provided they present credits for four years of English, one year each of elementary algebra and plane geometry, one year of Latin, and one year of manual training, are admitted to the College of Dentistry without conditions.

- (a) Any four-year course of a Minnesota state high school
- (b) A four-year course of other accredited schools in the state
- (c) A four-year course of schools in any other state accredited to the state university of that state
- (d) The advanced Latin or English course of the Minnesota State normal schools.

Students having no credit in manual training will be required to demonstrate, by test, the possession of mechanical ability.

Certificates of graduation must be presented on the regular University admission blanks, which may be obtained from the registrar.

Students not having credentials as indicated in either (a), (b), (c), or (d), are required to take the regular entrance examination. See program page 3.

State High School Board certificates are accepted in lieu of examinations in the subjects they represent.

Examinations are held only in the English language.

ADVANCED STANDING

Applicants for advanced standing must present satisfactory evidence of possessing the preliminary educational qualifications required of the class they desire to enter.

They must also satisfy the professors of the branches from which they wish to be exempt, that the work pursued by them in other institutions was equal in scope and amount to that passed by the class they propose to enter.

No credits are accepted unconditionally, the faculty reserving the privilege of examining any applicant when deemed necessary.

All certificates pertaining to advanced standing must be presented to the dean who will send them to the respective professors for acceptance or report of further requirements for acceptance.

Students coming from other schools must make up their technic conditions under supervision of the instructors of this school, at the convenience of the instructor.

One-year credit will be allowed graduates in medicine, but the dental technic branches of the first year must be taken and completed before advanced work in these branches can be entered upon, and the courses in dental pathology, dental histology and bacteriology taken as they occur in the curriculum.

When a student, for any cause, transfers from one college to another of the National Association of Dental Faculties, his certificate of attendance and standing must be verified by the dean of the school he withdraws from. This is done by correspondence between the executive officers of the two schools.

EXAMINATIONS, STANDINGS AND CONDITIONS

No student with an entrance condition will be allowed to register for any second-year subject, nor will any student with any first-year condition or failure be allowed to register for a third-year subject.

No student will be allowed to omit any freshman work in order to make up entrance conditions, except by special permission of the department affected.

Students will not be permitted to substitute private work in any branch for the regular college courses.

Final examination in every required subject is held at the close of the work at the end of the semester or quarter, according to the extent of the course given. Opportunity is offered to remove conditions at the opening of the school year in September. The examinations at the end of the semester or quarter are only for those who are taking the courses, while the September examinations are only for those who are attempting to remove conditions or are applicants for advanced standing.

The final standing of any student in a given subject shall be determined as the result of his (a) practical work (laboratory or clinical), (b) recitations, and (c) oral or (d) written examinations.

All of these factors shall be taken into consideration in making up the final grading in any subject.

Students' standings shall be determined at the end of the year by conference of the heads of the departments in which the work is pursued during that year.

All standings shall be reported officially to and from the registrar's office at the end of the year.

Students shall be reported as Passed, Incomplete, Conditioned or Failed.

No student will be registered for any examination to remove a condition until he presents a receipt from the cashier for the fee of such examination.

Conditions must be removed at the beginning of the school year in September. No student who has any conditions unremoved at the close of this examination is allowed to continue with his class without the express permission of the dean upon the recommendation of the department concerned.

A condition not removed at the first opportunity becomes a failure, subject to the rule governing failures.

Failures necessitate the taking of the work again in class.

A student repeating work (by reason of having "failed") must pay the fees connected with that course.

A student who is conditioned in the majority of the subjects given any year will become a "failed" student and must repeat the entire work that year.

Students who carry "failures" into a succeeding year may find a resultant conflict of study hours; in that event they will give preference to the unfinished studies of the lower conflicting course.

Practical work in the infirmary is not allowed to students having conditions, or incompletes in any technic work.

ATTENDANCE AND DISCIPLINE

Attendance upon all lectures, and infirmary and laboratory hours, as scheduled, is obligatory. A complete record of each student's attendance is kept, and all absences and tardinesses are noted.

Students to be eligible for final examinations, must have a record of not less than eighty per cent in attendance.

Habitual absence, continued indifference to study, or persistently poor scholarship, may subject the student to temporary or permanent suspension.

All laboratory courses must be taken in full and must invariably be entered upon during the first week in which they begin.

The connection of any student with this college may be terminated at any time, without a return of fees, whenever such action may be advisable on the ground of immorality or disorderly conduct, or a failure to conform to any of the established rules.

Students detected in the use of outside help, as notes, etc., in quizzes or examinations, or of rendering assistance to other students during examinations, will be suspended or expelled. The possession of any secret aids while under examination, will be deemed presumptive evidence of guilt, and will subject the student to the same penalty as if detected in using them.

Any student detected in stealing will be permanently expelled from the college, and be handed over to the civil authorities to be dealt with according to the law.

The practice of dentistry by students, except under the direct supervision of a preceptor, is prohibited by law in the state of Minnesota, and a rule of the National Association of Dental Faculties, to which this college belongs, reads as follows: "Students in attendance at colleges of this Association are required to obey the laws regulating the practice of dentistry in the various States, and, failing to do this, shall not be again received into any college of this Association." Any student detected in violating this rule will be suspended or expelled.

DEGREES

The degree of doctor of dental surgery is conferred by the Board of Regents upon the students who are recommended, by vote of the faculty,

for graduation. Candidates for the degree must possess the following essential qualifications:

- (1) Twenty-one years of age.
- (2) Good moral character.
- (3) Three full college years spent in the study of dentistry; the third year, at least, in this university, and the remainder in this or other recognized schools of dentistry.
- (4) Satisfactory examinations passed in all branches of the curriculum.

FEEES

The annual fee is one hundred and fifty dollars (\$150.00). It includes all charges for matriculation, lectures, laboratory courses, dissections, technic materials, microscopes and graduation.

One-half of this fee will be payable when the student matriculates. The accountant's receipts for the portion will entitle the holder to take entrance examinations and to classify. The second half will be payable at the opening of the second semester. These receipts must be presented to and countersigned by the dean before entering upon the work of each semester.

A deposit of five dollars (\$5.00) will be required in addition to the first semester fee, to cover loss of and breakage or damage to college property. This will be returned at the end of the year, providing there is no charge against the student. This fee is to be deposited with the University accountant each year when the student matriculates.

If the applicant fails to pass the entrance examinations, his fee will be returned by the accountant.

After having entered upon the course of study, fees are not returnable, and no rebate will be recommended should a student discontinue work, but the faculty may recommend the application of a part to the succeeding year.

The fee for condition examinations is one dollar (\$1.00).

The fee for advanced standing examinations is one dollar (\$1.00).

The fee for special examinations is five dollars (\$5.00).

Senior students failing to graduate, will be required to pay a fee of fifteen dollars (\$15.00) for each branch examined in or taken subsequent to the close of the session in which the failure occurred. A fee of fifteen dollars (\$15.00) will also be charged for the completion of each branch of unfinished laboratory or practical work.

Special and graduate students will pay to the accountant a fee of thirty dollars per year for each study they pursue, and additional fees, varying from ten to thirty dollars, for each laboratory course they may elect.

INSTRUMENTS, BOOKS, TOOLS AND MATERIALS

All students are required to provide themselves with instruments, books, tools and materials as prescribed by the college.

BREAKAGE AND LOSS

In each laboratory course the student will be assigned a certain amount of apparatus and material, for which he will give a receipt.

For apparatus and material attaching to his laboratory desk he will also be held responsible. At the end of each course, if such apparatus and material are restored in good condition, this receipt will be returned to him.

SUMMARY EXPENSES

	1st yr.	2d yr.	3d yr
Tuition, Instruments, Tools and Books	\$200.00	\$350.00	\$175.00
Room, Board and Incidentals	200.00	200.00	200.00

This is a general average and few use more than \$1,500.00 for the entire three years.

SPECIAL LECTURES

Occasional lectures are given during the senior year on subjects having a general bearing upon the practice of dentistry, such as: Ethics, Jurisprudence, Public Educational measures, etc.

ALUMNI ASSOCIATION

An association of the graduates of the college has its annual meeting during commencement week.

President, E. F. Wanous, Syndicate Block, Minneapolis.

Secretary, B. A. Sandy, Andrus Building, Minneapolis.

Course in Dentistry

FRESHMAN YEAR

FIRST SEMESTER

Anatomy 1, six hours, Professor Erdmann and Assistants
Chemistry 1 and 3, sixteen hours, Professor Frankforter and Assistants
Comparative Dental Anatomy 1, two hours, Dr. Hartzell
Dental Anatomy 1, three hours, Drs. Pike and Damon
Prosthetic Dentistry 1, fourteen hours, Drs. Pike and Damon

SECOND SEMESTER

Anatomy 2, twelve hours, Professor Erdmann and Assistants
Dental Anatomy 2, three hours, Drs. Pike and Damon
Histology and Embryology 5, eight hours, Professor Lee and Assistant
Physiology 1, six hours, Professor Beard and Assistants
Prosthetic Dentistry 2, eight hours, Drs. Pike and Damon

JUNIOR YEAR

FIRST SEMESTER

Crown and Bridge-Work 1, eight hours, Professor Wells and Assistant
Materia Medica 1, two hours, Dr. Schefcik
Operative Dentistry 1, fifteen hours, Professors Owre, Walls and Assistants
Orthodontia 1, six hours, Professor Weiss and Assistants
Pathology and Therapeutics 1, two hours, Professor Hartzell and Assistants
Prosthetic Dentistry 3, eleven hours, Professor Weiss and Assistants

SECOND SEMESTER

Crown and Bridge-Work 2, eight hours, Professor Wells and Assistant
Materia Medica 2, two hours, Dr. Schefcik

Operative Dentistry 2, fifteen hours, Professors Owre, Walls and Assistants

Orthodontia 2, four hours, Professor Weiss and Assistants

Pathology and Bacteriology 1, two hours, Professor Westbrook and Assistants

Pathology and Therapeutics 2, two hours, Professor Hartzell and Assistants

Prosthetic Dentistry 4, eleven hours, Professor Weiss and Assistants

SENIOR YEAR

FIRST SEMESTER

Crown and Bridge-Work 3, six hours, Professor Wells and Assistants

Dental Electricity 3, one hour, Professor Springer

Operative Dentistry 3, twenty hours, Professors Owre, Walls and Assistants

Oral Surgery 1, three hours, Professor Hartzell and Assistants

Orthodontia 3, five hours, Professor Weiss and Assistants

Physical Diagnosis and Anæsthesia 1, one hour, Drs. Wright and Owre

Prosthetic Dentistry 5, eight hours, Professor Weiss and Assistants

SECOND SEMESTER

Crown and Bridge-Work 4, six hours, Professor Wells and Assistants

Dental Metallurgy 1, two hours, Professor Owre

Operative Dentistry 4, twenty hours, Professors Owre, Walls and Assistants

Oral Surgery 2, three hours, Professor Hartzell and Assistants

Orthodontia 4, five hours, Professor Weiss and Assistants

Physical Diagnosis and Anæsthesia 2, one hour, Drs. Wright and Owre

Prosthetic Dentistry 4, eight hours, Professor Weiss and Assistants

Course of Instruction

ANATOMY

CHARLES A. ERDMANN, M.D., *Professor of Anatomy*

ARTHUR W. MEYER, B. S., M. D., *Assistant Professor of Anatomy*

EARLE R. HARE, B. S., M. D., *Instructor in Anatomy*

E. E. HEMINGWAY, Ph. D., *Assistant in Anatomy*

C. C. TYRRELL, Ph.B., M.D., *Prosector in Anatomy*

1. OSTEOLOGY

PROFESSOR ERDMANN, DRS. HARE AND TYRRELL

Four credits (twelve hours of each week, for six weeks)

First quarter

Required of freshmen.

Lectures and recitations upon the human skeleton and supplementary work on the osteology of domestic mammals. Practical study of the bones of the human body, and recitations from the specimen.

2. SYNDESMOLGY

PROFESSOR ERDMANN, DRS. HARE AND TYRRELL

Two credits (twelve hours of each week, for three weeks)

First quarter

Open to students having completed course 1. Required of freshmen.

Lectures and recitations covering the articulations, including the structure and movements of joints. Demonstrations from the specimen and preparation.

3. DISSECTION

ASSISTANT PROFESSOR MEYER, DRS. HARE AND TYRRELL

Six credits (twenty-four laboratory hours each week, for nine weeks)

Fourth quarter

Open to students having completed course 2. Required of freshmen.

Dissection of a complete lateral half of the human body, with special reference to the head and neck. Dissection of the human and comparative brain.

CHEMISTRY

G. B. FRANKFORTER, M.A., Ph.D., *Professor of Chemistry*

I. H. DERRY, B.S., *Assistant Professor of Chemistry*

J. A. HANDY, Ph.C., *Instructor in Chemistry*

1. GENERAL CHEMISTRY

ASSISTANT PROFESSOR DERRY AND MR. HANDY

Five credits (four recitation hours and twelve laboratory hours for nine weeks)

First quarter

Required of freshmen.

Lectures and laboratory work. The course includes a detailed study of chemical and physical properties of the non-metals and their more important compounds.

3. **QUALITATIVE CHEMISTRY** ASSISTANT PROFESSOR DERBY AND MR. HANDY
 Five credits (four recitation hours and twelve laboratory hours
 for nine weeks) Second quarter

Open to students completing course 1. Required of freshmen.

Lectures, recitations and laboratory work. The course includes the general functions of the metals and acids with their qualitative separation and identification.

For work in other special or technical lines of chemistry, numerous courses are offered (see Bulletin of the School of Chemistry in the department of physiology, in the pathology of the large number of lines.

The analysis of the urine is dealt with under physiological chemistry in the department of physiology, in the pathology of the urinary system in the department of pathology and in the clinical laboratories in connection with the microscopy of the urine.

COMPARATIVE DENTAL ANATOMY

M. V. HARTZELL, D.M.D., *Instructor in Comparative Dental Anatomy.*

1. **COMPARATIVE DENTAL ANATOMY** DR. HARTZELL
 Two credits (four recitation hours per week for nine weeks)
 Second quarter

Open to students completing anatomy 1 and 2. Required of freshmen.

The instruction in this subject embraces a comparative study of animal life, giving special attention to number, form and arrangement of teeth, and their adaptation to food habits, ranging from the horny teeth of the invertebrates, to the complex tooth-forms of the most highly specialized animals of the present time. The lectures will be illustrated with the stereopticon, casts, models and skulls.

CROWN AND BRIDGE-WORK

J. O. WELLS, A.M., D.M.D., *Professor of Crown and Bridge-Work*

F. S. YEAGER, D.D.S., *Instructor in Crown and Bridge-Work*

A. S. WELLS, B.A., D.D.S., *Instructor in Crown and Bridge-Work*

1. **CROWN AND BRIDGE-WORK** PROFESSOR WELLS AND ASSISTANTS
 Five credits (two recitation and six laboratory hours per week)
 First semester

Required of juniors.

Lectures, recitations, demonstrations and laboratory work. The latter includes all the more important forms of crowns and bridges.

2. **CROWN AND BRIDGE-WORK** PROFESSOR WELLS AND ASSISTANTS
 Five credits (two recitation and six laboratory hours per week)
 Second semester

Open to students completing 1. Required of juniors.

Continuation of course 1 as outlined above.

3. **CROWN AND BRIDGE-WORK** PROFESSOR WELLS AND ASSISTANTS
 Three credits (six laboratory hours per week) First semester

Open to students completing 1 and 2. Required of seniors.

Clinical lectures dealing with questions arising in the infirmary and clinical practice covering the entire field of crown and bridge-work.

4. **CROWN AND BRIDGE-WORK**
Continuation of 3 as outlined.

DENTAL ANATOMY

J. N. PIKE, D.D.S., *Instructor in Prosthetic Dentistry, Orthodontia and Dental Anatomy.*

G. M. DAMON, D.D.S., *Instructor in Prosthetic Dentistry and Dental Anatomy.*

1. **DENTAL ANATOMY** DR. PIKE, DR. DAMON
Two credits (one recitation and two laboratory hours per week) First semester
Required of freshmen.
This course will consist of lectures, recitations and such laboratory work as drawing, dissection, modelling and carving of teeth.

2. **DENTAL ANATOMY** DR. PIKE, DR. DAMON
Two credits (one recitation hour and two laboratory hours per week) Second semester
Open to students completing course 1. Required of freshmen.
Continuation of course 1 as outlined above.

DENTAL ELECTRICITY

F. W. SPRINGER, E.E., *Professor of Electrical Engineering*

3. **DENTAL ELECTRICITY** PROFESSOR SPRINGER
One credit (two recitation hours per week for nine weeks) First quarter
Required of seniors.
A course of instruction will be given upon the different forms of batteries, dynamos and motors in use in dental practice. Their construction, use, care and operation. Electricity as used in surgery and for therapeutic purposes, including application of x-rays, will be made clear by laboratory demonstrations and practical application.

DENTAL METALLURGY

A. OWRE, D.M.D., M.D., C.M., *Professor of Operative Dentistry and Dental Metallurgy*

1. **DENTAL METALLURGY** PROFESSOR OWRE
Two credits (two recitation hours per week) Second semester
Required of seniors.
Lectures, recitations and demonstrations, taking up the most important metals with special reference to those used in dentistry.

HISTOLOGY AND EMBRYOLOGY

T. G. LEE, B.S., M.D., *Professor of Histology and Embryology*W. S. NICKERSON, Sc.D., M.D., *Assistant Professor of Histology and Embryology*J. F. LEMSTROM, M.D., *Instructor in Histology and Embryology*

5. HISTOLOGY AND EMBRYOLOGY

PROFESSOR LEE AND ASSISTANTS

Six credits (eight recitation and eight laboratory hours per week)

Fourth quarter

Required of freshmen.

This course will consist of lectures, recitations, laboratory work and demonstrations, including the preparation of specimens illustrating important points in the structure and development of the teeth and jaws. The instruction will include a general consideration of the structure and properties of protoplasm, the cell, cell division, the ovum, reproduction and formation of the blastoderm, the differentiation of tissues and organs, a detailed study of the various tissues, epithelium, connective tissue, cartilage, bone, muscle, nerve, blood and lymph, the vascular and lymphatic system, the respiratory system, the excretory system, the nervous system. A special emphasis is laid upon the structure and development of the digestive system from a human and comparative standpoint.

MATERIA MEDICA

J. F. SCHEFCIK, B.S., Ph.G., M.D., C.M., *Instructor in Materia Medica*

1. MATERIA MEDICA

DR. SCHEFCIK

Two credits (two recitation hours per week)

First semester

Required of juniors.

This subject is covered as thoroughly as its importance demands. The writing and correct composition of prescriptions is an important feature. Particular attention is devoted to all therapeutic measures pertaining to dentistry. Practical work consists of the study of crude drugs and preparations, with demonstrations of all the pharmaceutical processes of importance.

2. MATERIA MEDICA

DR. SCHEFCIK

Two credits (two recitation hours per week)

Second semester

Open to students completing 1. Required of juniors.

Continuation of course 1 as outlined above.

OPERATIVE DENTISTRY

A. OWRE, D.M.D., M.D., C.M., *Professor of Operative Dentistry and Dental Metallurgy*J. M. WALLS, D.M.D., *Professor of Clinical Operative Dentistry*H. S. GODFREY, D.M.D., *Instructor in Operative Dentistry*N. J. COX, B.S., D.M.D., *Instructor in Operative Dentistry*H. A. MÄVES, D.D.S., *Instructor in Operative Dentistry*U. E. HEDDY, D.D.S., *Instructor in Operative Technics*W. F. LASBY, B.S., D.D.S., *Instructor in Technics*R. L. GREEN, D.D.S., *Instructor in Operative Dentistry*

1. OPERATIVE DENTISTRY

PROFESSORS OWRE, WALLS AND ASSISTANTS

Eight credits (three recitation and ten laboratory hours per week)

First semester

Required of juniors.

Lectures, recitations, demonstrations and laboratory work. The object of the latter is to teach technical procedure as much as possible before clinical practice is begun.

2. OPERATIVE DENTISTRY PROFESSORS OWRE, WALLS AND ASSISTANTS
Eight credits (three recitation and ten laboratory hours per week)
Second semester
Open to students completing 1. Required of juniors.
Lectures, recitations and clinical practice.
3. OPERATIVE DENTISTRY PROFESSORS OWRE, WALLS AND ASSISTANTS
Eleven credits (two recitation and eighteen laboratory hours per week)
First semester
Required of seniors.
Lectures, recitations, conference work, demonstrations and clinical practice covering the entire field of operative dentistry.
4. OPERATIVE DENTISTRY PROFESSORS OWRE, WALLS AND ASSISTANTS
Eleven credits (two recitation and eighteen laboratory hours per week)
Second semester
Open to students completing 3. Required of seniors.
Continuation of course 3 as outlined above.

ORAL SURGERY.

T. B. HARTZELL, D.M.D., M.D., *Professor of Clinical Pathology, Therapeutics and Oral Surgery*

F. R. WRIGHT, D.D.S., M.D., *Instructor in Anæsthesia and Oral Surgery*

O. OWRE, M.D., *Instructor in Oral Surgery*

1. ORAL SURGERY PROFESSOR HARTZELL AND ASSISTANTS
Two credits (one recitation and two laboratory hours per week)
First semester
Open to students completing courses 1 and 2, pathology and therapeutics.
Required of seniors.
The subject is taught by lectures, recitations and practical demonstrations upon the abundant clinical material available in the infirmary.
2. ORAL SURGERY PROFESSOR HARTZELL AND ASSISTANTS
Two credits (one recitation and two laboratory hours per week)
Second semester
Open to students completing 1. Required of seniors.
Continuation of course 1 as outlined above.

ORTHODONTIA

O. A. WEISS, D.M.D., *Professor of Prosthetic Dentistry and Orthodontia*

J. N. PIKE, D.D.S., *Instructor in Prosthetic Dentistry, Orthodontia and Dental Anatomy*

W. F. LASBY, B.S., D.D.S., *Instructor in Technics*

A. J. WEISS, *Instructor in Technics*

1. ORTHODONTIA PROFESSOR WEISS AND ASSISTANTS
Three credits (six laboratory hours per week)
First semester
Required of juniors.

This course consists entirely of technic work in the laboratory, comprising a brief course in the technique of steel which is followed by a comprehensive course in making regulating appliances, and the preparation of materials for the same.

2. ORTHODONTIA PROFESSOR WEISS AND ASSISTANTS
 Three credits (three laboratory hours per week) Second semester
 Open to students completing 1. Required of juniors.
 Continuation of course 1 as outlined above.
3. ORTHODONTIA PROFESSOR WEISS AND ASSISTANTS
 Three credits (one recitation and four laboratory hours per week) First semester
 Required of seniors.
 This course consists of lectures and recitations in which the theory and practice of orthodontia is fully considered.
 An ample clinic is provided which affords a comprehensive training in the practice of orthodontia. Every student is required to treat at least one case of irregularity of the teeth but may treat two or three cases.
4. ORTHODONTIA PROFESSOR WEISS AND ASSISTANTS
 Three credits (one recitation and four laboratory hours per week) Second semester
 Open to students completing 3. Required of seniors.
 Continuation of course 3 as outlined above.

PATHOLOGY AND BACTERIOLOGY

- F. F. WESBROOK, M.A., M.D., C.M., *Professor of Pathology and Bacteriology*
 R. H. MULLIN, B.A., M.B., *Senior Demonstrator in Pathology and Bacteriology*
 C. C. PRATT, M.D., *Demonstrator of Pathology and Bacteriology*
 H. E. ROBERTSON, A.B., M.D., *Demonstrator in Pathology*

1. BACTERIOLOGY AND PATHOLOGY PROFESSOR WESBROOK AND ASSISTANTS
 Two credits (four recitation hours per week for nine weeks) Second semester
 Required of juniors. A course of lectures, recitations and demonstrations of the general principles underlying pathology and bacteriology.

PATHOLOGY AND THERAPEUTICS

- T. B. HARTZELL, D.M.D., M.D., *Professor of Clinical Pathology, Therapeutics and Oral Surgery*

1. PATHOLOGY AND THERAPEUTICS PROFESSOR HARTZELL
 One and one half credits (one recitation and one laboratory hour per week) First semester
 Required of juniors.
 These subjects are taught by lectures and recitations involving general pathology as a foundation for the special pathology of the oral cavity; paying particular attention to the therapeutic requirements of the lesions of the mouth and teeth.

The work in pathology is supplemented by laboratory work under the care of the chair of pathology, department of medicine.

2. **PATHOLOGY AND THERAPEUTICS** PROFESSOR HARTZELL
 One and one half credits (one recitation and one laboratory hour per week) Second semester
 Open to students completing 1. Required of juniors.
 Continuation of course 1 as outlined above.

PHYSICAL DIAGNOSIS AND ANÆSTHESIA

- T. B. HARTZELL, D.M.D., M.D., *Professor of Clinical Pathology, Therapeutics and Oral Surgery*
 F. R. WRIGHT, D.D.S., M.D., *Instructor in Anæsthesia and Oral Surgery*
 O. OWRE, M.D., *Instructor in Oral Surgery*

1. **PHYSICAL DIAGNOSIS AND ANAESTHESIA** PROFESSOR HARTZELL,
DR. WRIGHT AND DR. OWRE
 One half credit (one laboratory hour per week) First semester
 Required of seniors.
 The subject of physical diagnosis will be taught didactically and practically, and will have direct bearing upon the subject of anæsthesia and will be as complete as its importance demands.
 A course in urinalysis will be given in connection with this course.
 The technics of anæsthetics, both general and local, receive full consideration. All anæsthetics are administered in the clinic, and full instruction concerning their use is given. The members of the senior class are required, under direction, to administer them and extract teeth under these agents.

2. **PHYSICAL DIAGNOSIS AND ANAESTHESIA** PROFESSOR HARTZELL,
DR. WRIGHT AND DR. OWRE
 One half credit (one laboratory hour per week) Second semester
 Open to students completing 1. Required of seniors.
 Continuation of course 1 as outlined above.

PHYSIOLOGY

- R. O. BEARD, M.D., *Professor of Physiology*
 M. R. WILCOX, M.D., *Assistant Professor of Physiology*
 J. P. SEDGWICK, B.S., M.D., *Instructor in Physiological Chemistry*

1. **PHYSIOLOGY** PROFESSOR BEARD AND ASSISTANTS
 Six credits (twelve recitation hours per week for nine weeks) Third quarter
 Required of freshmen.
 This subject is taught by recitations and lectures, illustrated by practical demonstrations. These embrace the discussion and, so far as possible, the observation of the physiological ingredients of the animal body; of the physiology of cell life or the fundamental properties of the cell; of the nutritive media, blood lymph and chyle; of the elementary functions of the nervous system; the muscular tissues; the vascular mechanism; the alimentary canal; the organs of secretion, excretion and respiration, and of the function of metabolism.

PROSTHETIC DENTISTRY

O. A. WEISS, D.M.D., *Professor of Prosthetic Dentistry and Orthodontia*

H. M. REID, D.D.S., *Instructor in Prosthetic Dentistry*

J. N. PIKE, D.D.S., *Instructor in Prosthetic Dentistry, Orthodontia and Dental Anatomy*

G. M. DAMON, D.D.S., *Instructor in Prosthetic Dentistry, Orthodontia and Dental Anatomy*

W. F. LASBY, B.S., D.D.S., *Instructor in Technics*

A. J. WEISS, *Instructor in Technics*

1. **PROSTHETIC TECHNICS** **DRS. PIKE AND DAMON**
 Seven credits (fourteen laboratory hours per week) **First semester**
 Required of freshmen.
 This course consists entirely of technic work in the laboratory, comprising impression materials and their uses and the simpler processes of plate-work.
2. **PROSTHETIC TECHNICS** **DRS. PIKE AND DAMON**
 Four credits (eight laboratory hours per week) **Second semester**
 Open to students completing 1. Required of freshmen.
 Continuation of course 1 as outlined above.
3. **PROSTHETIC DENTISTRY** **PROFESSOR WEISS AND ASSISTANTS**
 Six credits (one recitation and ten laboratory hours per week) **First semester**
 Open to students completing 1 and 2. Required of juniors.
 This course consists of lectures and recitations in which the principles and practice of plate-work are fully considered.
 The technic work in this course is a continuation of that begun in the freshmen year, and consists of the more difficult plate-work. This work is graded and consists only of practical processes; obsolete processes and unnecessary repetition are avoided.
4. **PROSTHETIC DENTISTRY** **PROFESSOR WEISS AND ASSISTANTS**
 Six credits (one recitation and ten laboratory hours per week) **Second semester**
 Open to students completing 3. Required of juniors.
 Continuation of course 3 as outlined above.
5. **PROSTHETIC DENTISTRY** **PROFESSOR WEISS AND ASSISTANTS**
 Four credits (eight laboratory hours per week) **First semester**
 Open to students completing 4. Required of seniors.
 Lectures and recitations cover the treatment of cleft palate cases and other special forms of prosthesis.
 An excellent clinic for general prosthetic dentistry affords ample opportunity for the student to treat a variety of cases by various methods of practice.
6. **PROSTHETIC DENTISTRY** **PROFESSOR WEISS AND ASSISTANTS**
 Four credits (eight laboratory hours per week) **Second semester**
 Open to students completing 5. Required of seniors.
 Continuation of course 5 as outlined above.

THE COLLEGE OF PHARMACY

The College of Pharmacy

FACULTY

CYRUS NORTHROP, LL.D., *President.*

FREDERICK J. WULLING, Phm.D., LL.M., etc., Dean: *Professor of Pharmacology*

RICHARD O. BEARD, M.D., *Professor of Physiology*

E. D. BROWN, Pharm.D., M.D., *Acting Professor of Materia Medica and Therapeutics*

FREDERIC E. CLEMENTS, Ph.D., *Professor of Botany*

IRA HARRIS DERBY, B.S., *Assistant Professor of Chemistry*

GEORGE B. FRANKFORTER, M.A., Ph.D., *Professor of Chemistry*

EVERHART P. HARDING, M.S., Ph.D., *Assistant Professor of Chemistry*

CHAS. F. SIDENER, B.S., *Professor of Quantitative Chemistry*

FRANK F. WESBROOK, M.A., M.D., C.M., *Professor of Bacteriology*

M. R. WILCOX, M.D., *Assistant Professor of Physiology*

.....*Professor of Pharmacognosy*

INSTRUCTORS AND ASSISTANTS

GUSTAV BACHMAN, Ph.C., Ph.M., *Instructor in Pharmacy*

OSCAR BLOSMO, Ph.C., *Assistant in Pharmacy*

FREDERICK K. BUTTERS, M.S., *Instructor in Pharmaceutical Botany and Microscopy and Pharmacognosy*

FRANK F. GROUT, B.S., *Instructor in Mineralogy*

JOHN A. HANDY, Ph.C., *Instructor in Chemistry*

GEORGE D. HEAD, B.S., M.D., *Instructor in Clinical Microscopy*

JOHN ELDON HYNES, Ph.C., *Assistant in Clinical Microscopy*

E. P. JONES, Ph.B., *Pharmacy Laboratory Assistant*

C. N. MCCLOUD, Phm.D., M.D., *Lecturer on First Aids to the Injured*

J. P. SEDGWICK, B.S., M.D., *Instructor in Physiological Chemistry*

W. D. SHELDON, M.D., *Instructor in Therapeutics*

.....*Instructor in Pharmaceutical Latin*

.....*Assistant in Materia Medica*

.....*Assistant in Pharmacognosy*

THE REGULAR COURSE

The complete regular course extends over two years of nine months each. Students may arrange their work so as to complete the course in three years, without additional expense to them for tuition.

ENTRANCE REQUIREMENTS

A.—To the Two-Year Course

While nearly all students enrolled in this college are graduates of full four-year high school courses, such a training prior to entrance is not obligatory at the present time. The requirements, however, are being raised gradually in such a way that soon they shall be a full high school preparation or an equivalent.

Applicants may be admitted without examination if they bring certificates of graduation from, or standing in, institutions of the collegiate grade or present other credentials showing that they have successfully completed the branches of study embraced in a full four-year high school course, or an equivalent, provided that among the branches completed are:

English, two years, including the principles of composition and practice in written expression.

Algebra, one year, elementary, up to beginning of higher algebra.

Geometry, one year, elementary.

Physics, one year, elementary.

Latin, two years: grammar, one year; Caesar (four books), one year.

- II. Other applicants must pass examinations in the branches above specified, i. e., in English, algebra, geometry, physics and Latin, or present satisfactory evidence of having completed these branches, for which substitutes cannot be accepted.

Students will be allowed to carry not more than two conditions which, however, must be removed before the final examinations in the first year subjects.

In certain cases credit is given for drug store experience.

B.—To the Three-Year Course

The minimum requirements for admission to the three-year course are the same as those for admission to the two-year course II., with the exception that students may carry as conditions not more than three of the entrance subjects among which English cannot be. Students must pursue the branches in which they are conditioned during their first year and pass examinations in them or present evidence of having satisfactorily completed the branches. The subjects are not taught at the college, but may be taken at the Academy near by, or at the city high schools or with

private tutors. The University Y. M. C. A. usually establishes courses for the benefit of students conditioned in entrance branches.

Applicants whose preparatory course of study has not conformed precisely to the requirements above enumerated will be allowed to offer, in lieu of a portion of these requirements, equivalent preparation in similar branches of study; and if they show, by examination, or by other evidence, that their preparation has been substantially equivalent, such branches will be accepted as substitutes for those omitted.

The examinations for entrance are conducted by the faculty of the college of pharmacy, in the pharmacognosy rooms, beginning at 9:00 a. m., on Tuesday, September 15, 1908. Lecture work begins as soon as possible after the examinations, usually the following day.

Every applicant is required to furnish a certificate of good moral character.

Those who do not pass the entrance examinations, may enter and complete their course in three years, provided they pursue the subjects required for admission, in addition to the professional work that may be assigned to them, and pass their entrance examinations, before the end of the first year. There are a number of preparatory schools in the neighborhood of the University, where the subjects required for admission may be pursued.

GRADUATE COURSES

In addition to the regular course this college offers two graduate courses, the first continuing through one college year and leading to the degree "master of pharmacy," and the second continuing through an additional year or longer, and leading to the degree "doctor of pharmacy." The first graduate course, the one leading to the master's degree, is now in operation. The curriculum includes higher pharmaceutical chemistry, pharmaceutical assaying, higher organic chemistry, proximate and ultimate analysis, chemistry of food, spectroscopic work, therapeutics, and bacteriology, and a thesis of at least 3,000 words, embodying the results of original work, but this curriculum may be changed by the faculty if occasion or experience require.

The requirements for admission are a diploma from a Minnesota high school of the first grade, or an equivalent; a diploma from a college of pharmacy whose curriculum, extent and kind of work and length of under-graduate course are equal to those of the under-graduate work of this college; an acquaintance with either German or French sufficient to enable the student to read and understand the scientific literature of those languages, and a certificate of registration as pharmacist from any state board of pharmacy. The fees for this course are seventy-five dollars,

and, upon graduation, an additional fee of ten dollars for diploma. The rules relating to damage, waste and breakage in laboratories are the same as those applying to the undergraduate course.

The course leading to the doctor's degree will begin as soon as there are sufficient applicants.

PROPOSED NEW COURSES

Beginning with the school year 1909, two additional courses will be instituted: the one, a lower and shorter than the regular course to conform to the minimum requirements of the American Conference of Pharmaceutical Faculties; the other, a higher than the regular course to lead to the degree, Bachelor of Science in Pharmacy, and to include four years of work. The details have not yet been worked out but it is probable that the former will include about two-thirds of the work of the regular course and will cover two years of at least six months each. Possibly opportunity will be offered to complete the work in twelve consecutive months. The entrance requirements will include the first year in high school or equivalent training or whatever the entrance requirements of the Conference may be at the time.

The higher course will cover four years of nine months each and will include two years of academic and cultural work. The qualifications for entrance to this course will be the same as those required for entrance to the College of Literature, Science and Arts. Those presenting evidence of having completed the first two years of a collegiate course may complete the course in two years, providing the collegiate work completed includes certain subjects in the sciences and mathematics. Full announcement regarding these courses will be made in next year's bulletin.

REGISTRATION

All applicants for admission to the regular courses must present to the Dean not later than September 15, their school or high school certificates, diplomas or such other credentials as they may wish to offer toward meeting in whole or in part the entrance requirements. If these are found satisfactory the applicant will register in the office of the University registrar, who will issue a card to the University accountant to whom the applicant will pay the tuition and breakage fees and microscope rental and receive receipts therefor. Registration is completed by depositing these receipts in the office of the Dean. The student is then classified.

PROFESSIONAL EXAMINATIONS AND STANDINGS

Examinations are held at the end of the regular school year and during the last week of the first semester, and are supplementary to the written

recitations and quizzes that are held at frequent intervals during the year, and with them form the basis of final determination of fitness for promotion or graduation. Students are rated throughout the year, and all who have a standing of ninety per cent, or more, in certain of the branches, may not be required to take the final examination in those branches.

Students are not required to write graduating theses, but instead, they keep complete records of all their laboratory work. The records are to be kept in substantially bound books, to be approved by the faculty. The respective professors call for the records for inspection and rating once a month or oftener. Duplicates of records are to be furnished the college and the students. The college provides the paper.

The standing of students is determined by the results of recitations, written examinations, laboratory work and attendance. It is indicated by the terms "excellent," "passed," "conditioned," "incomplete," or "failed." Conditions may be removed as indicated below. Incomplete work must be made up before the final examinations of the following year.

ATTENDANCE

In order to become eligible for final examinations, students are required to attend at least four-fifths of the lectures in each course. This rule is not intended for the benefit of those who seek admission after the opening of the college year, but is designed to cover cases of sickness or unavoidable absence. It does not apply to laboratory courses which must be taken in full and must be entered during the first week in which they begin.

CONDITIONS

Students having conditions in more than two major or in more than three minor subjects of the first year, cannot enter upon the second year's work. All entrance conditions must be removed before the next spring examination. Candidates for graduation must have removed all conditions before entering upon the second semester of the graduating year.

Condition examinations are held during the first week of the course in September. The dates are usually posted in June. Conditioned students are required to inform themselves as to these dates as soon as they learn that they are conditioned, as no other notice is given.

All who carry a condition and fail to remove it within one year will be charged an extra examination fee.

Students who carry a condition into a succeeding year may find a conflict of lecture or laboratory hours. In such cases they are to give preference to the lower course.

ADVANCED STANDING

Applicants for advanced standing must pass the entrance examinations or present the usual equivalents. They must furnish satisfactory evidence of time spent and subjects covered in previous professional studies, and must present themselves at the above date and pass the examinations of all departments in which they wish to be exempt, if such examinations are deemed necessary by the professors in charge of the various departments. Students will not be permitted to substitute private work in any branch for the regular course work.

REQUIREMENTS FOR GRADUATION

Regular attendance at lectures, recitations and laboratory exercises is required. Students will not be permitted to present themselves for final examination unless they have been in attendance upon at least seven-eighths of the required number of exercises.

Every person upon whom the degree is conferred must be of good moral character, and must be at least twenty-one years old; must have attended two full lecture and laboratory courses, the last at this college, and must have passed a successful examination in the subjects required for graduation.

Drug store experience is not a requirement for graduation.

Those who fail to appear for examination after having paid their diploma fee, or those who do not pass satisfactorily, will be permitted to present themselves at any subsequent examination, upon payment of an additional fee of five dollars, and complying with all other requirements.

DEGREE

This college confers the degree of Bachelor of Pharmacy, (Ph.B.), upon the graduates of the regular course.

FEES

TWO YEAR COURSE

First year	\$75.00
Second year	90.00
	————\$165.00

THREE YEAR COURSE

First year	\$45.00
Second year	55.00
Third year	65.00
	————\$165.00

There are no other fees in the regular course. Fees are payable at the time of registration. Those desiring to take special work will be required to pay fifteen dollars a subject in the didactic courses and twenty-five dollars in the laboratory courses.

Students will be charged for laboratory material if used unreasonably. At the end of the laboratory courses students will be required to pay for breakage and damage to utensils in their care. If a student is careful this charge need not amount to more than two or three dollars. Students are to provide themselves with a designated set of metric weights, a set of apothecary's weights and steel spatulas. The expense of these is within three dollars. Students using platinum crucibles are charged for same. Upon the return of the crucible in the original condition the charge is cancelled; if the crucible is in any wise damaged the full value is collected from the student. A rental of two dollars per college year or fraction is collected for use of a microscope. All money is payable to the accountant of the University, who will give receipts which must be deposited in the Dean's office.

Fees will not be returned, except in case of discontinuance for sufficient reason before the student has been assigned to a place in the laboratory.

BREAKAGE AND LOSS

In each laboratory course the student will be assigned a certain amount of apparatus and material, for which he will give receipt. At the end of each course, if such apparatus and material are restored in good condition, this receipt will be returned to him.

All apparatus lost or damaged will be charged to him, and must be paid for before he can receive credits for his course, or take his annual examinations.

CAUTION FEE

A deposit of ten dollars will be made with the accountant each year, by every student, at the time of enrollment as a caution fee. This fee is intended to cover the cost of unnecessary damage to or in the college buildings and of breakage and loss of laboratory apparatus and material. It will be returned to the student at the close of each year, minus the cost of articles assigned to him, that are not returned in good condition, or of damage to college property for which he is individually responsible. If responsibility for such damage cannot be individually fixed, a pro rata charge upon all students will be made.

GENERAL STATEMENT

Students are permitted to use their own crude drugs for the making of preparations, provided such material is approved by the Dean of the

college as suitable to demonstrate the lesson in hand. Finished products from such material, if of satisfactory quality, are at the disposal of the student, unless made with the tax-free alcohol belonging to the college.

Absence will not be excused, unless satisfactory reasons are given to the professor in charge. Habitual absence without a satisfactory excuse, continued indifference to study, or persistently poor scholarship may subject the student to temporary or permanent suspension. Students are earnestly requested to be present at the beginning of the school year, but those who cannot enter in the fall may enter at the beginning of the second semester taking any of the subjects beginning then. Special students, however, may enter at any time; they will not be rated on their work, nor will they be examined unless they make special request therefor. Any of the facilities for work in the University are open to the students of this college, subject to the approval of the Dean. Opportunity is afforded to do advanced work in all branches. Text-books may be obtained after coming to the University.

Rooms and board convenient to the college can be obtained at prices ranging from \$3.00 to \$5.00 per week, according to accommodations and furnished rooms without board, from \$5.00 to \$10.00, and unfurnished rooms from \$4.00 to \$7.00 per month.

A list of rooms and boarding places is kept by the secretary of the University Y. M. C. A., to whom inquiries or applications may be addressed.

POSITIONS FOR GRADUATES

The demand for graduates of this College has always been greater than the supply and is continually growing. The rule is that practically all of the senior class are engaged before graduation. This College is recognized in every state, including those in which standards of efficiency have been established, and its graduates are everywhere admitted to Board examinations.

STATE BOARD OF PHARMACY

The Board meets at the college four times each year. For information concerning the Board address the Secretary, Mr. Chas. J. Moos, 502 Bank of Commerce Building, Minneapolis, Minn.

COLLEGE OF PHARMACY ALUMNI ASSOCIATION

The Alumni Association meets annually in the college building the day before commencement, at 3 p. m. Every member of the Association is urgently requested to report change of address to the secretary.

COMMUNICATIONS

Address communications to the Dean, Professor Frederick J. Wulling, University of Minnesota, Minneapolis, Minn.

THE AMERICAN CONFERENCE OF PHARMACEUTICAL FACULTIES

The College of Pharmacy of the University of Minnesota is one of the twenty-nine colleges constituting the membership of the American Conference of Pharmaceutical Faculties.

COLLEGE TRAINING FOR PHARMACISTS

The recognition of the need of substantial college training for pharmacists finds expression in many ways. In New York, Pennsylvania, Hawaii, Wisconsin and Ohio such training is obligatory either by law or by rule of the Boards of Pharmacy. In a number of other states credit is given for college work. In Minnesota graduates from recognized colleges need to have only two years of practical experience, while all others must have four years of drug store experience before they become eligible for examination by the State Board of Pharmacy for full license to practice in Minnesota. At the Joint Conference of the National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties, held at Indianapolis, Ind., in September, 1906, the following resolution was adopted:

"Special education for the practice of pharmacy is in this age a necessity and should as rapidly as possible be made compulsory. The rules of the Boards of Pharmacy are such as to promote and encourage it in all practicable ways. The special pharmaceutical education should include substantial laboratory courses."

The training advocated by these two most representative bodies and by the American Pharmaceutical Association can be obtained only at colleges or schools of pharmacy of recognized standing. It is admitted that the State of Minnesota through its University College of Pharmacy is affording instruction of the most approved kind.

In the organization of this college the Board of Regents and the faculty have had the co-operation of the pharmacists of the state. The character of instruction is of high order and every effort is made to comply with the demands of the profession in the Northwest, or elsewhere, in the maintenance of a course of instruction of the highest grade. The college is located on the university campus, in the Medical Science Laboratory building, and is one of the colleges comprising the department of medicine, but is distinct in the government of its affairs. The

building and laboratories are on a par with the best, and their equipment is complete.

The work of the college, as outlined in the following pages, is conducted by means of lectures, recitations and laboratory exercises. Students find their time fully occupied. Those who feel unable to complete the work in two years may divide it in a manner to complete it in three years. Practising pharmacists who desire to take certain branches of study may avail themselves of any of the college facilities.

Courses of Instruction

COURSES OF INSTRUCTION COMPRISING THE REGULAR PHARMACY COURSE

The complete regular course extends over two years of nine full months each. Students may arrange their work so as to take the course in three years. It is quite possible that three years attendance will be required of students in this college in the near future. The sixteenth annual course begins on September 15, 1908, on which day all students in pharmacy should register. The office of the Registrar is open for the purpose of registration as early as September 8th, but students must first report at the Dean's office in the pharmacy building.

FIRST YEAR

FIRST QUARTER

Botany 1, eleven hours, Mr. Butters and Assistant
Pharmacy 9, five hours, Professor Wulling
Chemistry 1, fifteen hours, Professor Derby and Mr. Handy

SECOND QUARTER

Botany 1, six hours, Mr. Butters and Assistant
Pharmacy 10, three hours, Professor Wulling
Pharmacy 1, 2 and 3, twelve hours, Professor Wulling, Mr. Bachman
Mr. Blossmo and Assistant
Chemistry 2, fifteen hours, Professor Derby and Mr. Handy

THIRD QUARTER

Pharmacy 11, two hours, Professor Wulling
Pharmacy 4, four hours, Professor Wulling, Mr. Bachman, Mr. Blossmo
and Assistant
Pharmacy 7, one hour, Mr. Bachman
Materia Medica 1, five hours, Professor Brown and Assistant
Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor
Derby and Mr. Handy
Physiology 1, nine hours, Professors Beard and Wilcox

FOURTH QUARTER

Pharmacy 11, two hours, Professor Wulling

Materia Medica 2, five hours, Professor Brown and Assistant

Pharmacy 5 and 6, six hours, Professor Wulling, Mr. Bachman, Mr. Bloomo and Assistant

Pharmacy 7, two hours, Mr. Bachman

Pharmacy 8, one hour, Mr. Bachman

Botany 2 and 3, nine hours, Mr. Butters and Assistant

Chemistry 5, fifteen hours, Professor Frankforter, Assistant Professor Derby and Mr. Handy

SECOND YEAR

FIRST QUARTER

Pharmacy 12, one hour, Professor Wulling

Pharmacy 13, two hours, Professor Wulling

Pharmacy 14, sixteen hours, Professor Wulling, Mr. Bachman, Mr. Bloomo and Assistant

Mineralogy and Crystallography 1, one hour, Mr. Grout

Pharmacognosy 1, five hours, Mr. Butters and Assistant

Pharmacy 16 and 17, sixteen hours, Professor Wulling, Mr. Bachman and Assistants

Pharmacy 23, one hour, Mr. Bachman

SECOND QUARTER

Pharmacy 13, two hours, Professor Wulling

Mineralogy 2, one hour, Mr. Grout

Pharmacognosy 1, nine hours, Mr. Butters and Assistant

Pharmacy 18, sixteen hours, Professor Wulling, Mr. Bachman, Mr. Bloomo and Assistant

Chemistry 4, nine hours, Professor Frankforter, Assistant Professors Derby and Harding

Pharmacy 23, one hour, Mr. Bachman

THIRD QUARTER

Pharmacognosy 1, six hours, Mr. Butters and Assistant

Chemistry 3, sixteen hours, Professor Sidener and Assistant

Pharmacy 23, one hour, Mr. Bachman

Pharmacy 13, two hours, Professor Wulling

Pharmacy 19 and 15, twenty hours, Professor Wulling, Mr. Bachman, Mr. Bloomo and Assistant

FOURTH QUARTER

Pharmacy 13, one hour, Professor Wulling

Pharmacy 23, two hours, Mr. Bachman

Pharmacognosy 2, six hours, Mr. Butters

Pharmacy 20, 21, 22, 24, twenty hours, Professor Wulling, Mr. Bachman,
Mr. Blossmo and Assistant

Therapeutics 3, six hours, Professor Brown and Assistant

Pharmacy Law, one and one-half hour, Professor Wulling

First Aids, one and one-half hours, Dr. McCloud

THIRD YEAR

Students taking three years to do the work of the regular two-year course will divide the work in an equitable way subject to the approval of the Dean. Students are urged to devote three years to the completion of the course.

PHARMACY

FREDERICK J. WULLING, Phm.D., LL.M., etc., *Professor of Pharmacology*

GUSTAV BACHMAN, Ph.C., Ph.M., *Instructor in Pharmacy*

OSCAR BLOSSMO, Ph.C., *Assistant in Pharmacy*

E. P. JONES, Ph.B., *Laboratory Assistant*

1. HISTORY OF PHARMACY

PROFESSOR WULLING

One-third credit (six hours lecture)

First quarter, first year

The history of the U. S. Pharmacopœia through all its revisions.
Dispensatories, text-books, and works of reference.

2. METROLOGY

PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT

Two-thirds credit (twelve hours lecture)

First quarter, first year

Weights and measures, including metric system; balances—construction, varieties, methods of weighing; specific gravity in detail; specific volume, alligation, etc.

3. THE PHYSICS OF PHARMACY

PROFESSOR WULLING, MR. BACHMAN

AND ASSISTANT

Two and one-half credits (eighteen hours lecture, fifty-four hours laboratory)

Second quarter, first year

Prerequisite, pharmacy 2.

Students are required to have had elementary physics before entering. This course covers a review and more extended elucidation of such divisions of physics as apply to pharmaceutical processes. Special attention is paid to heat. Specific heat; thermometers—the various scales, testing and comparing thermometers; combustion of solids, liquids and gases in various kinds of furnaces, stoves and burners; application of heat in drying ovens, steam, hot-air and water ovens; drying closets, desiccators, blow-pipes, crucibles; baths for controlling and equalizing heat; water-salt-oil-glycerine-paraffin-hot-air-baths; evaporation—spontaneous, rapid, slow, in vacuo; ebullition—boiling points, fusion; sublimation, calcination, dehydration, torrefaction, roasting, reduction, oxidation; carbonization, de-

flagration, ignition, etc; solution—pharmaceutical, simple, chemical, saturated; circulatory displacement; dialysis—construction of dialyser, osmosis, endosmosis, exosmosis; crystalloids and colloids, etc.

4. PHARMACEUTICAL PROCESSES

PROFESSOR WULLING, MR. BACHMAN
AND ASSISTANT

Three and one-half credits (twenty-four hours lecture, seventy-two hours laboratory) Second and third quarters, first year

Prerequisite, pharmacy 3.

The processes not taken up in 3, constitute the subjects of this course. In part they are: drug grinding and powdering; comminution; contusion; trituration; sifting; elutriation; levigation; lixiviation; filtration—filtering media, filtration of solutions, oils, syrups, rapid filtration, filtration in vacuo, hot filtration, colation; washing—displacement, continuous; decantation—the syphon and its uses; precipitation—methods, vessels, separating, drying, weighing; granulation—granular effervescent salts; desiccation; exsiccation; crystallization—water of crystallization, deliquescence, efflorescence, methods of obtaining crystals, collecting, draining, washing, drying crystals, fractional crystallization; distillation—stills, simple, fractional, destructive; extraction; maceration; expression; percolation—history, theories, percolators, exhaustion, repercolation, continuous percolation, fractional percolation; clarification; decolorization

5. PHARMACOPOEIAL PREPARATIONS

PROFESSOR WULLING, MR. BACHMAN
AND ASSISTANT

Five credits (thirty hours lecture, one hundred twenty hours laboratory) third and fourth quarters, first year.

This course includes the study and preparation of official bodies for which the U. S. P. gives formulae and processes, and includes waters, solutions, syrups, mucilages, spirits, infusions, decoctions, tinctures, fluid extracts, vinegars, wines, liniments, oleates, ointments, cerates, resins, oleo-resins, honeys; glycerites, mixtures, emulsions, elixirs, collodions, pills, capsules, powders, suppositories, bougies, plasters, papers, cachets, etc.

6. MATHEMATICS OF PHARMACY

PROFESSOR WULLING AND MR. BACHMAN

While students are required to have a preparation in arithmetic and algebra before entering, they receive frequent drills at stated hours and as occasion requires or suggests throughout the entire course. Students are required to take a final examination in the subject at the end of the first year, at which examination they must attain a rating of at least eighty per cent.

7. PHARMACY QUIZ

MR. BACHMAN

Three credits (fifty-four hours) Second, third and fourth quarters,
first year

Prerequisites, pharmacy 2, 3, 4, and 5.

A thorough review of the work covered in 2, 3, 4, and 5.

8. IDENTIFICATION OF INORGANIC OFFICIAL PREPARATIONS

MR. BACHMAN

One credit (eighteen hours) Second and third quarters, first year
The study of the physical properties of official preparations.

9. CHEMICAL PHILOSOPHY

PROFESSOR WULLING

One and one-half credits (twenty-seven hours lecture)

First quarter, first year

Treats of the principles underlying chemistry, and endeavors to elucidate chemical facts and phenomena. The subject is divided into—chemical statics, embracing the study of the theories of atoms and molecules, atomic weights, atomic and

molecular volume, quantivalence, molecular structure, ions, electric qualities, etc., and—chemical dynamics, the study of reactions and their equations, thermics, chemical properties in general, etc.

10. **THE PHARMACEUTICAL CHEMISTRY OF THE NON-METALS AND THEIR PREPARATIONS** PROFESSOR WULLING
 One and one-half credits (twenty-seven hours lecture)
Second quarter, first year
 Prerequisite, pharmacy 9.
11. **PHARMACOPOEIAL INORGANIC SALTS AND THEIR OFFICIAL PREPARATIONS** PROFESSOR WULLING
 Three credits (fifty-four hours lecture)
Third and fourth quarters, first year
 Prerequisites, pharmacy 10.
 Especial reference to description, properties and manufacture.
12. **CLASSIFICATION OF PHARMACOPOEIAL ORGANIC COMPOUNDS** PROFESSOR WULLING
 One credit (eighteen hours lecture)
Third quarter, first year
 A preparation for pharmacy 13.
13. **CHEMISTRY OF THE PHARMACOPOEIAL ORGANIC COMPOUNDS AND THEIR PREPARATIONS** PROFESSOR WULLING
 Three credits (fifty-four hours lecture)
First, second, and third quarters, second year
 Prerequisite, pharmacy 12.
 This course includes the critical study of cellulose and its derivatives, destructive distillation products, starches, sugars, fermentation products, organic acids, fixed oils and fats, volatile oils, waxes, and animal fats, alkaloids, glucosides, animal drugs and products, etc.
14. **PHARMACOPOEIAL TESTING** PROFESSOR WULLING, MR. BACHMAN
AND ASSISTANTS
 Five credits (thirty-six hours lecture, one hundred eight hours laboratory)
First quarter, second year
 A critical study of the identity, purity, limit and percentage tests of the Pharmacopœia and their application either wholly or in part to practically every official organic and inorganic salt and compound.
15. **QUANTITATIVE ANALYSIS OF U. S. P. SALTS AND PREPARATIONS** PROFESSOR WULLING AND MR. BACHMAN
 Two credits (eighteen hours lecture, thirty-six hours laboratory)
Third quarter, second year
 Prerequisites, chemistry 3 and pharmacy 14.
 This course includes the gravimetric, volumetric and gasometric determinations of the U. S. Pharmacopœia, but not pharmaceutical assay work (20).
16. **INCOMPATIBILITY** PROFESSOR WULLING AND MR. BACHMAN
 One-half credit (nine hours lecture)
Second and third quarter,
second year
 Therapeutic, pharmaceutical and chemical incompatibility is taken up in lecture and recitation work preliminary to 17.
17. **DISPENSING** PROFESSOR WULLING AND MR. BACHMAN
 Five and one-half credits (twenty-seven hours lecture, one hundred forty-four hours laboratory)

Third and fourth quarters, second year

Prerequisite, pharmacy 16.

The study of the prescription and practical work in dispensing upwards of one hundred typical prescriptions

18. **MANUFACTURE OF OFFICIAL ORGANIC AND INORGANIC SALTS AND PREPARATIONS** PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT
Four and one-third credits (twenty-four hours lecture, one hundred eight hours laboratory) Second quarter, second year
The preparation of about forty official salts included in the course.
19. **NATIONAL FORMULARY** PROFESSOR WULLING AND MR. BACHMAN
One credit (six hours lecture, twenty-four hours laboratory)
Second and third quarters, second year
This course includes the study of the National Formulary and the making of one or more members of each class of preparations.
20. **PHARMACEUTICAL ASSAY** PROFESSOR WULLING, MR. BACHMAN AND ASSISTANT
One and one-third credits (six hours lecture, thirty-six hours laboratory) Fourth quarter, second year
Prerequisites, pharmacy 14 and chemistry 3.
The quantitative determination of active constituents of a number of the potent organic drugs and preparations.
21. **SYNTHETIC REMEDIES** PROFESSOR WULLING
One-third credit (six hours lecture) Fourth quarter, second year
Prerequisites, pharmacy 12 and 13 and chemistry 4.
A study of the chemistry of synthetic remedies in medical use.
22. **HOMEOPATHIC PHARMACY** PROFESSOR WULLING AND MR. BACHMAN
Fourth quarter, second year.
A brief exposition of the principles underlying homeopathic medication with some laboratory work.
23. **IDENTIFICATION OF SALTS** MR. BACHMAN
One and one-half credits (fifty-four hours laboratory)
Second semester, first year and entire second year
The study of the physical identity of the more important official inorganic and organic salts.
24. **MICRO-CHEMISTRY** PROFESSOR WULLING
Fourth quarter, second year. (Optional)
A brief course is provided for seniors if time permits.

CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., *Dean of the School of Chemistry*
Professor of Chemistry

CHAS. F. SIDENER, B.S., *Professor of Quantitative Chemistry*

EVERHART P. HARDING, M.S., Ph.D., *Assistant Professor of Chemistry*

IRA HARRIS DERBY, B.S., *Assistant Professor of Chemistry*

JOHN A. HANDY, Ph.C., *Instructor in Chemistry*

1. **GENERAL CHEMISTRY** PROFESSOR DERBY AND MR. HANDY
Five credits (forty-five hours lecture, ninety hours laboratory)
First quarter, first year

This course includes a study of the chemical properties of the metallic and non-metallic elements.

2. QUALITATIVE ANALYSIS

PROFESSOR DERBY AND MR. HANDY

Five credits (forty-five hours lecture, ninety hours laboratory)

Second quarter, first year

Prerequisites, chemistry 1.

This course covers the common reactions of the metals and acids and their qualitative separation. The ionic theory and the law of mass action are discussed with especial reference to qualitative reactions.

3. QUANTITATIVE ANALYSIS

PROFESSOR SIDENER AND ASSISTANT

Four and one-half credits (twenty-seven hours lecture, one hundred eight hours laboratory)

Second quarter, second year

Prerequisites, chemistry 1 and 2.

A study of the principles of quantitative estimation; gravimetric, volumetric and gasometric.

4. TOXICOLOGY, WATER AND FOOD ANALYSIS

PROFESSORS FRANKFORTER

DERBY AND HARDING

Three and one-half credits (twenty-seven hours lecture, seventy-two hours laboratory)

Second quarter, second year

The chemistry of the atmosphere, water, soil, etc.; the sanitary examination of air and water.

5. ORGANIC CHEMISTRY

PROFESSORS FRANKFORTER, DERBY AND

MR. HANDY

Nine and one-half credits (seventy-two hours lecture, one hundred ninety-eight hours laboratory)

Third and fourth quarters, first year

This course includes work in both the aliphatic and aromatic series and the preparation of the more important compounds.

BOTANY AND MICROSCOPY

FREDERICK E. CLEMENTS, Ph.D., *Professor of Botany*

FREDERICK K. BUTTERS, M.S., *Instructor in Pharmaceutical Botany and Microscopy*

.....Assistant

1. COMPARATIVE MORPHOLOGY OF THE CRYPTOGRAMS

PROFESSOR CLEMENTS

MR. BUTTERS

Four credits (thirty-six hours lecture, seventy-two hours laboratory)

First year

The course embraces the comparative morphology of the cryptogams. Especial attention is paid to the green algae, the foundation of the vegetable kingdom. The other groups of algae and the fungi are briefly treated, particular stress being laid on their economic relations to other plants, to animals and to man. About one-half of the semester is devoted to the study of the archegoniate series of plants. Numerous examples of liverworts, mosses, ferns, and their allies are studied in the laboratory, and the line of development which leads from the algae through the archegoniate series to the seed plants is emphasized.

2. THE MORPHOLOGY AND ANATOMY OF THE HIGHER SEED PLANTS

PROFESSOR CLEMENTS AND MR. BUTTERS

Four credits (thirty-six hours lecture, seventy-two hours laboratory)

Prerequisite, botany 1.

In this course especial attention is paid to vegetable histology. The characteristic plant tissues are examined, and their arrangement is noted in roots, stems, leaves, fruits and seeds. The formation and occurrence of carbo-hydrates, glucosides, alkaloids, organic acids, resins, gums, gum-resins and oleo-resins are carefully studied.

3. MICRO-BOTANY

MR. BUTTERS

Designed to furnish practical training in the use of the microscope, in the preparation of material for microscopic examination, including the use of micro-chemical reagents, and in the representation by drawings of all structures observed.

The work of this course is co-incident with that of 2 and 3.

These courses occupy the equivalent of six and one-half hours a week throughout the junior year. They aim to give a comprehensive and scientific view of the vegetable kingdom, to lay a broad foundation for the study of pharmacognosy. Throughout the course attention is frequently directed in the lectures to the wider relations of plants to one another and to animals, and to the discussion of the plant as a living unit, thus bringing before the class the fundamental problems of plant physiology and ecology.

The successful completion of the course in botany is prerequisite to the study of pharmacognosy.

PHARMACOGNOSY

.....*Professor of Pharmacognosy*
FREDERICK K. BUTTERS, M.S., *Instructor in Pharmacognosy*

.....*Assistant*

1. CRUDE VEGETABLE DRUGS

MR. BUTTERS

Seven credits (fifty-four hours lecture, one hundred forty-four hours laboratory) Second, third, and fourth quarters, second year
Prerequisites, Botany 1, 2, and 3.

The vegetable drugs of the United States Pharmacopœia are taken up in the following order: Roots, rhizomes, tubers and bulbs, woods, barks, leaves, herbs and flowers, fruits, seeds, plant exudations, resins, gum-resins, waxes and starches. Each drug is carefully examined, both macroscopically and microscopically. Students are also provided with specimens for home study. The lectures give, in compact form, the history and important features of each drug, with consideration of its importance to the pharmacist. The quizzes include careful drill on the constituents, action and dose and official preparation of each drug considered. Identification receives careful attention and there are weekly tests of the student's ability. A short course is given in the microscopic examination of some of the more important alkaloids and glucosides, and of certain emulsions and inorganic salts, if time permits.

The drugs are considered in the following order:

Roots—Sarsaparilla (Mexican, Para and Honduras), senega, gentian, taraxacum, pyrethrum, inula, lappa, apocynum, stillingia, sumbul, asclepias, phytolacca, althaea, belladonna, bryonia, calumba, rheum, glycyrrhiza, (Spanish and Russian), ipecacuanha, pareira, krameria, rumex.

Rhizomes—Aspidium, zingiber (Jamaican, East Indian and African), calamus, veratum viride, iris, cypripedium, convallaria, tritium, sanguaria, geranium, podophyllum, valeriana, arnica, serpentaria, spigelia.

hydrastis, caulophyllum, cimicifuga, leptandra, gelsemium, menispermum.

Tubers and Bulbs—Jalapa, aconitum, colchicum, scilla, allium.

Twigs and Woods—Quassia, hæmatoxylon, santalum rubrum, gualacum, dulcamara.

Barks—Cinchona (Rubra et Flava), prunus virginiana, vilburnum prunifolium, viburnum opulus, rubus, quercus alba, granatum, aspidosperma, frangula, rhamnus purshiana, juglans, xanthoxylum, mezereum, gossypii radix, euonymus, quillaja, ulmus, sassafras, cascarilla, cinnamomum (Ceylon, Saigon and cassia).

Leaves and Leaflets—Pilocarpus, eucalyptus, uva ursi, senna (Alexandria and India), coca (Bolivian and Truxilla), belladonna, stramonium, hyoscyamus, tabacum, digitalis, matico, salvia, hamamelis, castanea, eriodictyon, chimaphila, buchu (long and short), rhus toxicodendron.

Herbs and Flowers—Santonica, caryophyllus, sambucus, calendula, cusso, arnica, matricaria, anthemis, rosa gallica, rosa centifolia, crocus, zea, chondrus, cetraria, cannabis indica, pulsatilla, scoparius, eupatorium, grindelia, tanacetum, artemisia, absinthium, lobelia, mentha piperita, mentha viridis, melissa, hedeoma, marrubium, scutellaria, chirata, sabina, chelidonium.

Fruits—Humulus, piper (longum, nigrum et album), cubeba, pimenta, rhus glabra, capsicum, colocynthis, cassia fistula, chenopodium, illicium, cardamomum, vanilla, coriandrum, conium, anisum, carum, fœniculum (Roman and German), macis, aurantii amari cortex, aurantii dulcis cortex, limonis cortex, prunum, tamarindus (East and West Indian), phytolacca, ficus, rubus.

Seeds—Physostigma, amygdala (dulcis et amara), pepo, myristica, sinapis (alba et nigra), nux vomica, staphisagria, ricinus, tiglium, stramonium.

Miscellaneous—Guarana, lactucarium, alœ (Socotrina, Barbadosensis, et Capensis), catechu, kino (Malabar et Pallas), opium, elastica, manna, saccharum, saccharum lactis, mel, acacia, tragacantha, mastiche, gualacum, benzoinum, cambogia, asafœtida, ammoniacum, scammonium, myrrha, copaiba, terebinthina, terebinthina canadensis, resina, pix (Burgundica et liquida), styrax, balsamum peruvianum, balsamum toluatanum, camphora, thymol, menthol, ergota (Spanish and German), sassafras medulla, galla (Aleppo et Chinensis), gossypium purificatum, kamala, lupulinum, lycopodium, amyllum, cetaceum, cera, cantharis, coccus, ichthyocolla, moschus, carbo animalis.

Besides the foregoing, a number of the more important unofficial drugs will also be discussed.

2. POWDERED DRUGS

MR. BUTTERS AND ASSISTANT

One credit (nine hours lecture, twenty-seven hours laboratory)

Fourth quarter, second year

Prerequisite, pharmacognosy 1.

This course consists of laboratory work and occasional lectures.

The more important vegetable drugs are examined microscopically, in powdered form. Especial attention is paid to the identification of unknown powders, and to the detection of the various forms of sophistication to which powdered drugs are subject.

MATERIA MEDICA AND THERAPEUTICS

E. D. BROWN, Pharm.D., M.D., *Acting Professor of Materia Medica and Therapeutics*

W. D. SHELDON, M.D., *Instructor in Therapeutics*

..... *Assistant in Materia Medica*

1. INORGANIC MATERIA MEDICA

PROFESSOR BROWN AND ASSISTANT

2. **ORGANIC MATERIA MEDICA** PROFESSOR BROWN AND ASSISTANT
 Five credits (ninety hours lecture and recitation)
Third and fourth quarters, first year
 The work in inorganic and organic materia medica is based principally on the U. S. P., but unofficial and synthetic drugs are also studied. The course includes the study of the general characteristics of drugs and of physiological action. Pharmacodynamics, including the study of the identity and quality of drugs, shares attention in the course of pharmacognosy.
3. **THERAPEUTICS** PROFESSOR BROWN AND DOCTOR SHELDON
 One credit (eighteen hours lecture and recitation)
Third quarter, second year
 Prerequisites, materia medica 1 and 2.
 In this course drugs are studied in groups, as governed by their physiologic action, and the therapeutic features of such groups are described. Remedial measures other than those depending upon drugs, are fully considered.

. PHYSIOLOGY

RICHARD O. BEARD, M.D., *Professor of Physiology*

M. R. WILCOX, M.D., *Professor of Physiology*

JULIUS PARKER SEDGWICK, B.S., M.D., *Instructor in Physiological Chemistry*

1. **PHYSIOLOGY, ANATOMY AND HISTOLOGY . . . PROFESSORS BEARD AND WILCOX**
 Four and one-half credits (eighty-one hours lecture and recitation)
Third quarter, first year
 I. The work covers the study of the physiological properties of the cell, the nutritive media, the nervous mechanisms in general, muscular tissues, connective tissues and epithelial tissues. The subjects of anatomy and histology are touched upon sufficiently to lay the foundation for the proper understanding of physiological functions.
 Special demonstrations are given upon animals and the living subject, illustrating the physiological functions in the muscular, nervous, vascular, respiratory and glandular systems, special attention being directed to the action of drugs and their effects upon the various systems.
2. **QUALITATIVE AND QUANTITATIVE URANALYSIS (Post-Graduate)** PROFESSOR BEARD AND DR. SEDGWICK
 One credit (nine hours lecture, eighteen hours laboratory)
Second semester
 Prerequisite, Physiology 1.
 Lectures, recitations and laboratory work. The laboratory work includes the qualitative analysis of representative specimens of urine as regards their physical properties, inorganic and organic constituents, as well as the quantitative determination of chlorides, urea, ammonia, total nitrogen, sugar and albumin, together with the preparation of reagents.
3. **EXPERIMENTAL PHYSIOLOGY (Post-Graduate)** PROFESSORS BEARD AND WILCOX
 Four credits (thirty-six hours lecture, seventy-two hours laboratory)
Second semester
 Prerequisite, physiology 2.
 Laboratory work and demonstrations. A study of physiologic apparatus, electric stimuli and methods of experimentation;

the demonstration and performance of experiments which illustrate physiologic function in the muscular, nervous, vascular, respiratory and glandular systems; and the study of the cardiac areas, the heart and respiratory sounds, and of pulse tracings including training in the use of sphygmograph, the stethoscope, phonendoscope, etc.

4. PHYSIOLOGICAL CHEMISTRY AND MICROSCOPY (Post-Graduate)

PROFESSORS BEARD AND WILCOX AND DR. SEDGWICK

Eight credits (seventy-two hours lecture, one hundred forty-four hours laboratory)

First semester

Prerequisite, physiology 3.

Laboratory work and demonstrations. A practical study of the several classes of proteids; of carbohydrates, fats, muscle and bone; of gastric juice, saliva, pancreatic juice and bile in their respective digestions; of glycogen, and of blood lymph, chyle and milk. Microscopic study of the carbohydrates in vegetable and animal forms; of the physiologic emulsions of fat; of the crystalline waste products, and of the physiologic conditions of the blood cells and of blood crystals. Practical instruction is given during this course in the enumerations of the blood cells, in the estimation of hæmoglobin and of the corpuscles in mass, in the spectroscopic examination of the blood in the determination of blood tests, and in the use of the polariscope.

PHARMACEUTICAL MINERALOGY AND CRYSTALLOGRAPHY

1. MINERALOGY

MR. GROUT

One credit (eighteen hours lecture)

First quarter, second year

Prerequisite.

A study of the occurrence and properties of minerals of pharmaceutical importance; ores of metals used in pharmacy; non-metallic minerals and mineral waters in their mineralogic and geologic relations.

2. CRYSTALLOGRAPHY

MR. GROUT

One credit (eighteen hours lecture)

Second quarter, second year

Prerequisite, mineralogy 1.

A survey of form and more evident physical characters as a basis for practice in sight recognition of economic minerals and their distinction from common rocks.

PHARMACEUTICAL JURISPRUDENCE

1. LAW FOR PHARMACISTS

PROFESSOR WULLING

Two-thirds credit (twelve hours lecture)

Fourth quarter, second year

The lectures introduce the subjects of contracts, agency, commercial paper, insurance, and discuss the liability of retail and manufacturing pharmacists, etc.

FIRST AIDS TO THE INJURED

1. EMERGENCY CASES

DR. MCCLOUD

Two-thirds credit (twelve hours lecture)

Third quarter, second year

A series of lectures designed to qualify the pharmacist to administer upon emergency cases before the arrival of the physician.

BACTERIOLOGY

Lectures and demonstrations. The general scope of bacteriology, the history of its development and the biological and chemical problems involved in the life history of bacteria will be dealt with. The classification of the various bacterial forms, the methods of isolation and culture and

the composition and manufacture of culture media will be studied until a thorough knowledge of technique is acquired. General and special study of the various antiseptics, disinfectants and bactericidal substances and conditions will be undertaken.

Laboratory work, involving the making of their own culture media by the students, the study of bacteria in cultures and under the microscope, technique of staining and other methods, including observations of chemical and biological peculiarities, will be thoroughly carried out. Testing of various germicides—chemical and physical—and the use of bacteriological methods in the examination of drinking water will form an important part of the work. Eighteen hours per week during the last eight weeks of the second semester, second year.

PROFESSOR WESBROOK, DR. CHOWNING.

This course is optional with students of pharmacy at present, but may be made obligatory.

CLINICAL MICROSCOPY

Instruction includes (a) the macroscopical study of urine, its colors, sediments, and finer chemical tests; (b) the microscopical study of urinary sediments, including blood, pus, epithelial cells, casts, etc.; (c) the macroscopical and microscopical study of sputum, including the study of sputa from cases of pneumonia, pulmonary tuberculosis, asthma, chronic bronchitis, etc.

Lectures and laboratory work. Eight hours weekly; last third, second semester, second year.

(Post-Graduate.)

DR. GEORGE DOUGLAS HEAD.

MINNESOTA PHARMACY LAW

Several lectures elucidating the rights, duties, privileges and liabilities of pharmacists under the state law regulating the practice of pharmacy, are given by special lectures near the close of the second year.

SPECIAL LECTURES

From eight to twelve special lectures on subjects related to the practice of pharmacy are delivered by well-known pharmacists of the state at intervals during the college year.

DISPENSARY PRESCRIPTION PRACTICE

The dispensing department of the University Free Dispensary at 1810 Washington Avenue South has lately been placed in charge of the College of Pharmacy, Mr. G. Bachman having supervision. The senior students are sectioned into classes of three for the purpose of doing practical prescription work at the dispensary under the direction of Mr. Bachman or Mr. Bloomo. The dispensary practice continues throughout the college year.

LECTURE AND LABORATORY SCHEDULES

The work of the regular course for 1908-'09 will be somewhat augmented but the herewith schedule of the past year will be adhered to as far as possible. The necessary changes will be posted on the college bulletin in September.

The college year is divided into four quarters, the first and second constituting the first semester and the third and fourth, the second semester. The college year covers nine full months or thirty-eight weeks. Each quarter consists of nine working weeks.

FIRST QUARTER, 9 WEEKS.
SEPT. 15 TO NOV. 14.

SECOND QUARTER, 9 WEEKS.
NOV. 16 TO JAN. 30.

1908	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30
MON.	Botany Laboratory				Pharmaceu- tical Chemistry				Pharmaceutical Laboratory				Qualitative Chemistry			
TUES.	Botany Lecture	Pharm. Chemistry			General Chemistry					Botany Laboratory		Pharm. Chemistry	Qualitative Chemistry			
WED.	Botany Laboratory				Pharm. Chemistry				Pharmaceutical Laboratory				Recitation			
THUR.	Botany Lecture	Pharm. Chemistry			General Chemistry					Botany Laboratory		Pharm. Chemistry	Qualitative Chemistry			
FRI.	Botany Laboratory				Pharm. Chemistry				Pharmaceutical Laboratory				Qualitative Chemistry			
SAT.	Make up Laboratory															
MON.		U. S. P. Testing			Dispensing				Pharmacognosy Laboratory				Toxicology, Food & Water			
TUES.		U. S. P. Testing			Dispensing				Operative Pharmacy				Operative Pharmacy			
WED.	(Organic Pharm.	Identi- fication	Mineral. and Crystall.	Pharmacog- nosy Lecture					(Organic Pharm.	Identi- fication	Mineral. and Crystall.	Pharma- cognosy Lecture	Toxicology, Food & Water			
THUR.		U. S. P. Testing			Dispensing				Operative Pharmacy				Operative Pharmacy			
FRI.		U. S. P. Testing			Dispensing				Pharmacognosy Laboratory				Toxicology, Food & Water			
SAT.	Make up Laboratory															

On Saturday mornings the pharmaceutical laboratory is open for the benefit of students who for sufficient reason may be behind in their laboratory work.

SECOND SEMESTER—JUNIOR AND SENIOR SCHEDULE.

THIRD QUARTER.
Feb. 2 to April 3.

FOURTH QUARTER.
April 5 to June 5.

1909	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30	8:30	9:30	10:30	11:30	1:30	2:30	3:30	4:30
MON.	Materia Medica		Physiology						Materia Medica		Botany Laboratory					(Organic Chemistry)
TUES.	Pharm. Chemistry	Materia Medica	Pharmaceutical Laboratory						Pharm. Chemistry	Materia Medica	Pharmaceutical Laboratory					(Organic Chemistry)
WED.	Materia Medica		Physiology						Materia Medica		Botany Laboratory					(Organic Chemistry)
THUR.	Pharm. Chemistry	Materia Medica	Pharmaceutical Laboratory						Pharm. Chemistry	Materia Medica	Pharmaceutical Laboratory					(Organic Chemistry)
FRI.	Materia Medica		Physiology						Materia Medica		Botany Laboratory					(Organic Chemistry)
SAT.			Make up Laboratory								Make up Laboratory					

FIRST YEAR.

MON.			Quantitative Chemistry						Pharm. Labor.	First Aids	Law	Therapeutics				Pharmaceutical Laboratory
TUES.		Pharmacognosy Laboratory		Organic Pharmacy					Pharm. Labor.		Pharmacognosy Laboratory	Identification				Pharmaceutical Laboratory
WED			Quantitative Chemistry						Pharm. Labor.	(Organic Pharmacy)	New Remedies	Therapeutics				Pharmaceutical Laboratory
THUR.		Pharmacognosy Laboratory		Organic Pharmacy					Pharm. Labor.		Pharmacognosy Laboratory	Identification				Pharmaceutical Laboratory
FRI.			Quantitative Chemistry						Pharm. Labor.	First Aids	Law	Therapeutics				Pharmaceutical Laboratory
SAT.			Make up Laboratory								Make up Laboratory					

SECOND YEAR.

Pharmaceutical laboratory work includes U. S. P. and N. F. preparations, the manufacture of some U. S. P. salts, assay, and homeopathic pharmacy. Quantitative analysis includes gravimetric, volumetric, and gaseometric determinations.

THE SCHOOL of MINES

The School of Mines

FACULTY

CYRUS NORTHROP, LL.D., *President*

WILLIAM R. APPLEBY, M. A., *Dean and Professor of Metallurgy*

CHARLES E. VAN BARNEVELD, B.A., Sc., E.M., *Professor of Mining Engineering*

PETER CHRISTIANSON, B.S., E.M., *Assistant Professor of Assaying*

JOHN J. FLATHER, Ph. B., M.E., *Professor of Mechanical Engineering*

GEORGE B. FRANKFORTER, Ph. D., *Professor of Chemistry*

BENJAMIN F. GROAT, B.S., *Professor of Mechanics and Mathematics*

CHRISTOPHER W. HALL, M.A., *Professor of Mineralogy and Geology*

FREDERICK S. JONES, M.A., *Professor of Physics*

WILLIAM H. KAVANAUGH, M.E., *Professor of Experimental Engineering*

WILLIAM H. KIRCHNER, B. S., *Professor of Drawing and Descriptive Geometry*

EDWARD P. MCCARTY, E.M., *Assistant Professor of Mining*

EDWARD E. NICHOLSON, M.A., *Assistant Professor of Chemistry*

LEVI B. PEASE, M.S., *Assistant Professor of Metallurgy*

GEORGE D. SHEPARDSON, M.A., M.E., *Professor of Electrical Engineering*

CHARLES F. SIDENER, B.S., *Professor of Chemistry*

INSTRUCTORS AND ASSISTANTS

ELTING H. COMSTOCK, M. S., *Instructor in Mathematics*

FRANCIS C. FRARY, M. S., *Instructor in Chemistry.*

FRANK F. GROUT, B.S., *Instructor in Mineralogy*

ALOIS F. KOVARIK, M. A., *Instructor in Physics.*

L. W. MCKEEHAN, *Assistant in Descriptive Geometry*

NORMAN W. ROSE, M. E., *Instructor in Drawing*

FRANK B. ROWLEY, B. S., M. E., *Instructor in Drawing*

WILLIAM T. RYAN, E. E., *Instructor in Electrical Engineering*

CHARLES F. SHOOP, B.S., *Instructor in Mechanical Engineering*

ADMISSION

Examinations for admission will be held at the beginning of the year. See calendar and program of examinations.

All candidates for admission must take entrance examinations in Algebra and Geometry to the extent indicated in syllabi, pages 15 and 16. These examinations will be held in Room 23, School of Mines Building.

No student will be registered for first semester's work after September 26th, 1908, or for second semester's work after February 13th, 1909.

All applicants should present themselves to the registrar who will furnish them with application blanks and directions covering examinations and registration.

Women will not be admitted to any course offered in the School of Mines.

GENERAL REGULATIONS GOVERNING ADMISSION

- I. Students will be admitted to the freshman class on passing the regular entrance examinations.
- II. No student will be admitted if conditioned in more than three half-year subjects, or their equivalent. No conditions, however, in entrance mathematics shall be allowed except upon special permission of the Department of Mathematics.
- III. Graduates of any Minnesota State high school will be admitted without examination, except in Mathematics, provided—
 - (1) That the school maintain a full four-year course of high school work.
 - (2) That the applicant present to the registrar the principal's certificate showing the satisfactory completion of all the studies required for admission to the desired University course.
- IV. Graduates of Minnesota State high schools who are deficient in not more than three half-year subjects or their equivalent, may be excused from entrance examinations in such subjects as the enrollment committee may decide upon; such candidates should present themselves to the committee not later than Tuesday of examination week.
- V. Graduates of Minnesota State high schools whose principal's certificate shows them to be deficient in more than three half-year subjects or their equivalent, even though they have made such additional preparation as they deem necessary, must take, nevertheless, the regular entrance examination in all subjects, as provided in sections

- I. and II., unless excused by vote of the faculty; and persons wishing to present reasons for such excuse should report to the enrollment committee not later than Tuesday of examination week.
- VI. Graduates of the advanced courses of Minnesota normal schools will be admitted upon the same terms as graduates of State high schools.
- VII. Any Minnesota high school or academy not under supervision of the State High School Board, but requiring for graduation a four-years' course, exclusive of the common school branches, conforming essentially in distribution of time to the entrance requirements of at least one of the University courses, will, upon application, be inspected by a committee, and, after favorable recommendation, may be accredited by the faculty in all respects as are the State high schools, provided—
- (1) That the school be open to inspection at any time by the University:
 - (2) That it take such supplementary examinations as may be prescribed from time to time.
- VIII. Graduates from schools in other states, whose diplomas admit to reputable colleges in the state in which the school is located, will be received subject to the regulations that apply to graduates of Minnesota State high schools.
- IX. Applicants from schools not coming within any of the above classes must take the regular entrance examinations or present State High School Board certificates, and take examinations in entrance Mathematics.

In all cases the faculty reserves the right to require a student to take supplementary examinations if he does not sustain himself creditably in his course.

The enrollment committee will meet every day during the week commencing September 7th, in School of Mines Building, room 25, at 9 o'clock, a. m.

REQUIREMENTS FOR ADMISSION TO THE FRESHMAN CLASS

N.B.—Time element, as indicated with each subject, is essential:—

English, four years, including:

- (a) Classics
- (b) Principles of composition
- (c) Practice in written expression

Algebra, elementary, one year

Algebra, higher, one-half year

Geometry, plane, one year

Geometry, solid, one-half year

In addition to the above named required subjects, for which no substitutes will be accepted, the student shall present evidence of having completed work in any of the following subjects, entitling him to eight year-credits:

Latin, four years

Grammar, one year

Caesar, four books, one year

Cicero, six orations, one year

Virgil, six books, one year

Greek, two years

Grammar, one year

Anabasis, four books, one year

German, two years

Grammar, one year

Literature, one year

French, two years

Grammar, one year

Literature, one year

Spanish, two years

Grammar, one year

Literature, one year

Swedish, Danish-Norwegian, Icelandic, two years

Grammar, one year

Literature, one year

History

Ancient to Charlemagne, one year

Modern from Charlemagne, one year

England, one half year

Senior American, one half year

American Government, one half year

Political Economy, one half year

Physics, one year

Chemistry, one year

Botany, one half or one year

Zoölogy, one half or one year

Astronomy, one half year

Geology, one half year

Physiography, one half year

Commercial History and Commercial Law, one year.

Freehand Drawing, one year

Mechanical Drawing, one year

Book-keeping, one half year

Syllabi

The following statements indicate, in a general way, the ground expected to be covered in the study of the various subjects accepted for admission:

English (four years)

In order to secure a definite plan of study and unity of method on the part of preparatory schools, the entrance requirement in English is outlined below somewhat in detail. Where texts are mentioned they are merely suggestive and not arbitrary. Equivalents will be accepted in lieu of any of the texts mentioned. The entrance requirement in English covers four years of the high school course, and not less than four hours a week should be devoted to the subject. The headings under which instruction will naturally fall are:

- (a) English Classics
- (b) The Principles of Rhetoric
- (c) Practice in Written Expression

(a) English classics should include a critical reading, in class, of English masterpieces. The following are suggested as well adapted for such study: Shakespeare's "Macbeth," Milton's "Paradise Lost," books one and two; Burke's "Conciliation with America"; Carlyle's essay on "Burns." In the study of these works the student should come to know the leading facts connected with the author and his time; he should become familiar with the subject-matter of the work; thoroughly at home with the story, and have a clear idea of the form and structure of the work as a whole.

A less critical knowledge of other standard or classic works, which may perhaps be read by the student at home, with written reports and brief oral discussion in class, is desirable. The following works are noted as indicative of the minimum amount of work expected: at least two of Shakespeare's plays, beside the one read in class, one of Irving's works, one of Hawthorne's novels, one of Stevenson's novels, and one of Webster's orations.

(b) The work in the Principles of Composition should include the principals and technical terms of ordinary texts upon the subjects, whether acquired by direct study of such texts or mainly by the study of selected English masterpieces. It should not be forgotten that this is not an end in itself, but simply a means of teaching the student the correct use of English.

(c) Not less than one hour each week throughout the four years of the high school course should be devoted to practice in written expression. The instructor may choose such topics as local conditions may require or make most profitable, but whatever line of work is pursued, the student should be taught to use language correctly and forcibly, and learn to express himself clearly and logically in writing.

Elementary Algebra (one year)

The four fundamental operations for rational algebraic expressions; factoring; highest common factor; lowest common multiple; fractions, including complex fractions; linear equations, both numerical and literal, containing one or more unknown quantities; problems involving linear equations; binomial theorem for positive integral exponents; powers and roots of rational algebraic expressions and of numbers.

Higher Algebra (one half year)

This course should begin with a thorough review of the work of the previous course, to the end that principles should be learned and theorems and rules rigorously demonstrated. Numerous problems which involve putting questions into equations should be solved, attention being paid to gaining an understanding of the principles involved rather than to mere dexterity in solution.

The new topics to be treated are:—theory of exponents; surds; quadratic equations, both numerical and literal; equations with one or more

unknown quantities that can be solved by the methods of quadratic equations; progressions; graphs.

Plane Geometry (one year)

The usual theorems and constructions contained in the best text books, including the general properties of plane rectilinear figures; the circle and measurement of angles; similar polygons; areas; regular polygons and the measurement of the circle.

Special emphasis should be placed upon developing the ability to solve original exercises, loci problems, and problems involving the mensuration of lines and surfaces.

Solid Geometry (one half year)

The usual theorems and constructions contained in the best text books including the relations of planes and lines in space; the properties and measurement of prisms, pyramids, cylinders and cones; the sphere and spherical triangle.

Original exercises, loci problems and problems involving the mensuration of surfaces and solids should form an important part of the course.

ADVANCED STANDING

The University accepts records from other colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work in this University, subject to the approval of the departments concerned. In bringing records from other institutions, the certificates must be on the official blanks of the institution granting the certificate, and should show:

1. The subjects studied and ground covered
2. The time spent upon each subject
3. In case of laboratory subjects, a concise statement of work done
4. The result—it is sufficient to state that the subjects were creditably completed.

Students who desire to obtain advanced standing must present their applications and certificates to the enrollment committee who will consult the departments concerned in determining the credit to be given.

DAILY ROUTINE

The daily session is divided into eight recitation periods of fifty minutes each, four in the morning and four in the afternoon. The morning session begins at 8:30 and closes at 12:35 o'clock. A general assembly of the faculty and students is held at 10.25 o'clock, at which there are brief and simple religious exercises. The noon hour extends from 12:35 to 2 o'clock. The afternoon session begins at 2:00 o'clock, and continues until 5:40. Work extends through six days of the week.

EXAMINATIONS -

Students failing to receive a semester mark of 75 per cent in any subject shall have the privilege of a supplementary examination before the opening of the following year.

Students failing to receive a semester mark of 50 per cent in any subject shall not be allowed to pursue any dependent subject.

The faculty will exclude students from attending classes in any subject upon recommendation of the department concerned.

Students failing to pass supplementary examinations must register the next year for those subjects in which they have failed. They may take in addition other subjects appearing in courses of instruction, pages 33 to 40, with the exception of Mining and Metallurgical courses, based upon requirements of the various courses and daily program. They may also take certain electives in other colleges, provided suitable arrangements can be made.

Each student must obtain from the Registrar his yearly average in all subjects and present himself for supplementary examinations, according to the program given on page 4.

All students must report in time to make suitable arrangements with departments concerned in case of conflicts in program.

No other supplementary examinations will be given. Students failing to report for supplementary examinations will be compelled to take work over in class as in case of failures.

Students failing to present themselves for final examination at the end of the first or second semester will be given zero on the examinations.

Students whose absences in either semester exceed four weeks in the aggregate are not permitted to take examinations without special permission of the faculty.

A fee of five dollars per subject is required for each special examination.

UNCLASSED STUDENTS

No unclassified students will be admitted to the School of Mines.

GRADUATION

Students completing courses of study to the satisfaction of the faculty are entitled to receive the appropriate degrees. Any person may undergo, at suitable times, examinations in any subject. If such person pass in all the studies and exercises of a course, he is entitled to the appropriate degree, provided, that at least one full year be spent at the University before such degree shall be granted, and provided, the examination in every case be held before a committee of the faculty appointed for that purpose.

THESES

Every member of the Senior class is required to prepare a type-written thesis which must be submitted for approval not later than April 10th. Theses must be handed in properly bound, together with original drawings, tracings, negatives and one set of clear blue prints therefrom, not later than May 1st.

The subject for the thesis will be the development, exploitation and equipment of a mining property or metallurgical plant. Considerable latitude is allowed in selecting conditions and location, subject, however, to the final approval of the professor in charge of the department.

The selection must be made and work must begin prior to the Christmas vacation. Students are expected to devote at least twelve hours a week to the preparation of their theses during the second semester.

Special Information

In the School of Mines there are two regular courses of study, viz.: Mining Engineering and Metallurgy, leading to the degree of Engineer of Mines (E. M.), and Metallurgical Engineer (Met. E.) respectively.

The degree of Met. E. may be conferred upon a candidate who received the degree of E. M. in four years, and vice versa, provided such a candidate completes an additional year's work at the school and presents a suitable thesis.

Students in the college of science, literature and the arts, in the college of engineering and mechanic arts, and school of technical and applied chemistry, who contemplate taking a degree in this school after completing their course, are recommended to select their electives with reference to as full a preparation as possible for the technical work of the course they propose to enter.

FEEES

A registration fee of fifteen dollars is required at the beginning of each semester from residents of the state, and thirty dollars from non-residents.

The various laboratory fees are as follows:

Chemical laboratory (Qualitative).....	Per semester	\$5.00
Chemical laboratory (Quantitative).....	"	7.00
Mineralogical laboratory	"	3.00
Assaying laboratory	"	15.00
Experimental laboratory	"	6.00
Electrical laboratory	"	5.00
Ore testing laboratory	"	10.00

The trip to the mines made by the junior class costs the student from one hundred to one hundred and seventy-five dollars.

Books cost about as follows:

Freshman year	\$12.00 to \$15.00
Sophomore year	8.00 to 10.00
Junior year	18.00 to 25.00
Senior year	10.00 to 30.00

A number of books are recommended to the student, but the purchase of them is optional. The lower estimates given will cover the cost of books that must be purchased.

Each member of the freshman class must be provided with a set of draughting instruments. The necessary instruments will cost about fifteen dollars.

A number of valuable catalogs and pamphlets are loaned members of the senior class in the study of mechanics. A deposit of \$3.00 shall be made with the Accountant by each member, to be refunded upon the return in good condition of all such matter.

SUMMARY OF EXPENSES

FRESHMAN YEAR

*Incidental fee	\$30.00
Chemical laboratory fee	10.00
Mineralogical laboratory fee	6.00
Assaying laboratory fee	15.00
Books	13.00
Draughting instruments	15.00
Note book and supplies	6.00
	<hr/>
	\$95.00

SOPHOMORE YEAR

*Incidental fee	\$30.00
Chemical laboratory fee	14.00
Books	8.00
Note books and supplies	2.00
	<hr/>
	\$54.00

JUNIOR YEAR

*Incidental fee	\$30.00
Steam laboratory	2.00
Trip to the mines	\$100.00 to 175.00
Books	20.00
Note books and supplies	2.00
	<hr/>
	\$154 to \$229.00

SENIOR YEAR

*Incidental fee	\$30.00
Chemical laboratory fee	10.00
Electrical laboratory fee	5.00
Ore testing laboratory fee	10.00
Experimental laboratory fee	6.00
Books	30.00
Note books and supplies	2.00
	<hr/>
	\$93.00

*For non-residents the incidental fee is \$60 per year.

Good board can be obtained at a cost varying from \$2.50 to \$4.00 per week. Room rent varies from \$5.00 to \$10.00 per month. With two occupying one room, the rent per student would be considerably lower.

ORGANIZATION

The organization of the School of Mines dates back to 1889, when the general faculty of the University recommended to the Board of Regents its establishment. In 1891 the Legislature of the State of Minnesota voted an appropriation for establishing and equipping the school. Two annual appropriations have since been made for its support. The legislature of 1901 appropriated \$47,500 for a new School of Mines building. In 1903 the legislature appropriated \$25,000 for completing and equipping the School of Mines building, and in 1905 an additional sum was provided for equipment.

SCHOOL OF MINES BUILDING

The School of Mines building is designed to accommodate only the technical work of the School of Mines, as adequate building accommodations and equipment have already been furnished for chemistry, geology, mineralogy, drawing and mechanical and electrical engineering. The building is 150 feet long by 65 feet wide. It is a brick building three stories high. The lower floor is occupied by the assaying and metallurgical laboratories; the second floor contains offices, two large lecture rooms, department library, and a museum; the third floor provides two quiz rooms, a large, well lighted draughting room, thesis room, a dark room and a blue print room. This building makes possible the development of the work already begun and offers facilities for more extended work along technical lines.

LOCATION

The University of Minnesota is located in the city of Minneapolis, on the east bank of the Mississippi river. The School of Mines has its buildings and laboratories on the same ground. Students of the School of Mines have, therefore, all the opportunities afforded by a large university.

Minneapolis is surrounded by and is in direct communication with several important mining and smelting districts. As the city is a railroad center, all possible transportation facilities are available.

FIELD WORK

Field work is conducted at the iron mines in the northern part of this state, in the copper and iron regions of Michigan, in the mines and smelters of Montana, Colorado, Utah and California, and in the coal mines of Pennsylvania.

At least one of these districts will be visited by each class, affording splendid opportunities for study and observation.

The field work in mining and metallurgy consists of one trip at the close of the Junior year. For details see pages 24 and 30.

Students must deposit with **Accountant**, at least **two weeks** before time set for the departure of class, a sum sufficient to cover following expense items:

1st. Board and lodging

2nd. Necessary mine supplies

Incidental expenses are not included in the above items and must be met individually.

A statement of expenditures will be rendered at the close of the work and any balance existing will be refunded.

The amount of deposit required will vary, according to the locality visited, and will be announced each year when arrangements for the trip are completed.

THE ELLIOT SCHOLARSHIP LOAN FUND

To fulfill the wish of the late Dr. A. F. Elliot to aid young men who find their efforts to obtain a practical education embarrassed through lack of means, the sum of \$5,000 was placed in the hands of the Board of Regents as a scholarship fund. The income from this fund is loaned students in the School of Mines on the following conditions:

The financial needs of the applicant, his scholarship, moral character, enthusiasm shown in his work and promise of usefulness in his profession. When money is available it may be loaned to pay expenses of

worthy students during sickness. The loans are to be repaid, without interest, at the earliest convenience of the recipients.

LIBRARY

The library consists of about two thousand two hundred volumes. This number represents only those works that treat directly of mining and metallurgical subjects.

The school has a complete set of the leading mining and metallurgical journals, and other similar books of reference. The leading periodicals are accessible to all. Constant references in lectures compel the student to keep himself well informed as to the latest methods, machinery and changes in practice going on in his special line of work.

In addition to the above, many thousand volumes on chemistry, mineralogy and geology complete a most valuable working and reference library. A card index is kept of all articles of value and interest appearing in the leading periodicals.

PHOTOGRAPHY

Photographs of surface and underground appliances, metallurgical plants, copies of drawings and other photographs are indispensable to the study of mining and metallurgy. With the report of his field work every student is expected to present photographs, as well as sketches, of various objects under consideration. There is also a very complete set of lantern slides illustrating the principal methods of underground workings and metallurgical plants, at home and abroad. Several hundred slides have been made in the department's laboratory which bear directly on the work done in Minnesota and the neighboring northwest. Many valuable photographs are constantly being made. Blue prints of these are given students as illustrations. Much time is thus saved, usually spent in making sketches and diagrams.

CLASSIFICATION OF SUBJECTS

The work falls under the following subdivisions, supplemented by thorough courses in mechanics, mathematics, physics, chemistry, mineralogy and geology:

(a) **Assaying**—to determine if ore has value for treatment. (b) **Mining engineering**—to furnish material for treatment. (c) **Ore testing**—To determine best method of treatment. (e) **Ore dressing**—furnishing products for metallurgical treatment. (e) **Metallurgy**—smelting and refining ores and ore dressing products; reduction to metals.

DEPARTMENT OF MINING ENGINEERING

Mining engineering extends through sophomore, junior and senior years. The subjects given together with the sequence necessary, are treated in the accompanying outline of the course.

Until the first semester of the junior year, the course consists of lectures and recitations only. In the subsequent work, text-books are used in connection with the lectures.

In the senior year, problems in hoisting, hauling, pumping, ventilation and similar subjects become an important part of the work.

DESIGNS AND SPECIFICATIONS

The student makes in connection with his thesis work working drawings of mine cars, skips and other parts of mine equipment that are usually designed and made at the mine.

MINE SURVEYING

The work in surveying is given in the first semester of junior year and is designed solely for mining engineers.

The work begins with the elements of plane surveying with special reference to the computations necessary, followed by the higher theoretical work in plane surveying and its application to the problems met in underground surveying. This is followed by a course in mine mapping during the second semester of junior year and six weeks of field work as follows: Beginning with the first Monday in May the class meets daily for the practice of plane surveying at some readily accessible locality (to be announced each year). The duration of this course is four weeks. Eight hours a day.

The students are divided into squads of two or four, and each is required to complete satisfactorily the following exercises and surveys:

1. Chaining
2. Compass reading
3. Adjustment of hand levels and practice in leveling
4. Adjustment and use of wye levels
5. Adjustment of mining transit
6. Reading angles
7. Traverse with steel tape
8. Azimuth traverse with stadia
9. Determination of meridian, latitude and time by solar and stellar observations

10. Survey of mining claim according to the regulations of the U. S. Government

11. Measurement of earthwork

12. Laying out railroad tangents, curves and crossings

Each squad must provide itself with a 6-foot steel tape, graduated to hundredths.

After the completion of this work from ten days to two weeks are spent in the actual underground survey of a mine or part of a mine in some mining district in Minnesota or Michigan.

A full equipment of surveying instruments of the latest and best makes is furnished to each squad for this work.

Students who furnish satisfactory evidence of proficiency in this work may be given credit therefor. The department, however, reserves the right in any case to require such students to take a theoretical or a practical examination or both.

FIELD WORK IN MINING

During the second semester arrangements are made by the department with various representative mines in the West to give students an opportunity to gain practical underground mining experience, and at least six weeks of such work is required of the student during the vacation following junior year. This work must be done at a mine selected by the department (the preference of the student will be consulted in so far as possible) subject to the following conditions:

Upon the termination of the metallurgical work about June 20th (this work follows immediately upon completion of the mine surveying) the student will report to the superintendent of the particular mine to which he is assigned. On no account is he to report later than July 1st. For fifteen days he will be set to work in various parts of the mine without remuneration. For the remainder of the summer he must engage in regular miner's work for which he may be paid current wages.

Four weeks of such work will be *required*. He will be subject to the regular mine discipline. In case he is discharged no attempt will be made by the department to investigate, but the student will be allowed to make up the work at the end of senior year. His degree will be withheld until all work is completed.

In the event of unforeseen contingencies, such as accidents, the sudden closing down of a mine, etc., the work must be made up at the first opportunity.

The student must keep a diary and record therein, in minute detail, all work done, his observations, sketches, etc. This diary shall be handed

in to the department not later than Sept. 10th of each year, together with an affidavit to the effect that it is authentic and is a true record of the work done by him. Prior to registration for the second semester of senior year the student must submit a typewritten report fully illustrated with sketches drawn to scale, covering all the mining and milling operations together with details of plant and equipment.

ORE DRESSING

The lectures and recitations in ore dressing extend through the second semester of the junior year, and comprise the detailed study of ore dressing and concentrating machinery, together with the study of typical combinations of dressing machines as found in the several mining districts of the United States.

In connection with the theoretical work, the ore dressing and testing plant of the school is utilized for practical illustrations.

COURSE IN MINING ENGINEERING

FRESHMAN YEAR

FIRST SEMESTER

Chemistry 1, eight hours, Mr. Frary
Descriptive Geometry 3, one hour, Professor Kirchner
Drawing 1, six hours, Professor Kirchner and Assistants
Mathematics 1, five hours, Mr. Comstock
Mineralogy 1, eight hours, Professor Hall and Mr. Grout

SECOND SEMESTER

Chemistry 2, eight hours, Assistant Professor Nicholson and Mr. Frary
Descriptive Geometry 4, two hours, Professor Kirchner
Drawing 2, four hours, Professor Kirchner and Assistants
Mathematics 2, five hours, Mr. Comstock
Metallurgy 1, twelve hours, Professor Appleby, Assistant Professor Christianson and Assistant Professor Pease
Mineralogy 2, four hours, Professor Hall and Mr. Grout

SOPHOMORE YEAR

FIRST SEMESTER

Chemistry 3, eight hours, Professor Sidener
Drawing 5, eight hours, Professor Kirchner and Assistants
Mathematics 3, five hours, Professor Groat and Mr. Comstock
Metallurgy 3, three hours, Assistant Professor Christianson
Physics 1, four hours, Professor Jones and Mr. Kovarik

SECOND SEMESTER.

Chemistry 5, eight hours, Professor Sidener
Drawing 6, four hours, Professor Kirchner and Assistants
Mathematics 4, five hours, Professor Groat and Mr. Comstock
Metallurgy 4, three hours, Assistant Professor Christianson
Mining 1, four hours, Assistant Professor McCarty
Physics 1, four hours, Professor Jones and Mr. Kovarik

JUNIOR YEAR

FIRST SEMESTER

Geology 3, two hours, Professor Hall
Experimental Engineering 1, four hours, Mr. Shoop
Geology 9, four hours, Mr. Grout
Mechanics 5, five hours, Professor Groat
Metallurgy 5, four hours, Assistant Professor Pease
Mining 2, five hours, Professor van Barneveld

Mining 3, five hours, Professor van Barneveld and Assistant Professor McCarty

SECOND SEMESTER

Geology 10, four hours, Mr. Grout

Experimental Engineering 2, four hours, Mr. Shoop

Mechanics 6, five hours, Professor Groat

Metallurgy 6, four hours, Assistant Professor Pease

Mining 2, five hours, Professor van Barneveld

Mining 5, five hours, Assistant Professor McCarty

Mining 8, five hours, Assistant Professor McCarty

Mechanical Engineering 18, two hours, Professor Flather

Field work. Months of May, June, July and August

Mine Surveying 7 beginning about May 1st. Six weeks

Professor van Barneveld

Assistant Professor McCarty

Metallurgy 8, one week

Professor Appleby

Assistant Professor Christianson

Assistant Professor Pease

Practical Mining 9, six weeks

Professor van Barneveld

Assistant Professor McCarty

SENIOR YEAR

FIRST SEMESTER

Chemistry 14, eight hours, Professor Sidener

Electrical Engineering 4, six hours, Mr. Ryan

Geology 12, four hours, Professor Hall

Mechanics 7, five hours, Professor Groat

Metallurgy 2, ten hours, Professor Appleby, Assistant Professor Christianson and Assistant Professor Pease

Mining 4, five hours, Professor van Barneveld

Mining (Thesis) 10, two hours, Professor van Barneveld and Assistant

SECOND SEMESTER

Chemistry 18, eight hours, Professor Sidener

Experimental Engineering 9, four hours, Professor Kavanaugh

Geology 3, four hours, Professor Hall

Mechanics 8, three hours, Professor Groat

Mining 4, five hours, Professor van Barneveld

Mining (Designs and Specifications) 6, eight hours, Professor van Barneveld and Assistant

Mining (Thesis) 10, four hours, Professor van Barneveld and Assistant

DEPARTMENT OF METALLURGY

This department is well supplied with representative ores of all the most important metals, drawings of furnaces, models and samples of all the different furnace products. The lectures treat of all the principal methods now in use.

The practical work consists in visits to smelting and refining works which are accessible. The work in metallurgy extends through three years.

ASSAYING

The lectures treat of and describe apparatus, reagents, assay furnaces, fuels, etc., in connection with this subject. The principles of assaying and sampling are fully explained. A collection of representative ores of various metals with a collection of corresponding slags are shown, and instruction is given as to nature and quantity of fluxes. Special and rapid methods of testing slags and metallurgical products as employed in western smelting works are emphasized.

The laboratory course includes preparing and testing reagents, making cupels, etc., and assaying samples of ore, furnace and mill products, and bullion; different charges are tried and practical conclusions drawn.

Great importance is attached to the work in the laboratory. A large well ventilated furnace room in which are located muffle and crucible furnaces, and another room of similar dimension equipped with desks, pulp and bead balances, afford accommodations to a large number of students. Ores of various metals of known value are given the students, who are required to make up the necessary charges and submit their reports in detail. This work is offered to students completing the necessary courses in mineralogy and chemistry.

The Assay Laboratories are located in the School of Mines Building and consist of:

1st Preparation room. This room is 62 feet long by 36 feet wide and accommodates 66 students. Here samples and reagents are weighed preparatory to assaying. Each student is furnished with a complete set of apparatus, including a pulp balance for individual use. All operations are therefore conducted with the greatest economy of time and entirely apart from the furnace room. The separation of the preparation room from the furnace room is of greatest importance. Nearly all ores are crushed and pulverized by suitable machines run by electric motors. Students are compelled to pulverize by hand a minimum number of samples, thereby saving much time for extended and advanced work in special lines.

2nd. Furnace room. This room is 60 feet long by 42 feet wide. The

high ceiling and special ventilation provided for this room make it a most comfortable assay furnace room. It provides for the accommodation of twelve double-decked muffle furnaces, twenty-four crucible furnaces and twelve gasoline furnaces. After the sample has been placed in a suitable vessel for fusion, it is taken to the furnace room, which communicates directly with the preparation room.

3rd. Balance room. This room is 31 feet long by 16 feet wide. In this room are various types of balances for accurately weighing gold and silver beads and bullion. The room is specially lighted by electric cove lights from the ceiling. The balances are placed on heavy brick piers which are independent of the walls of the building.

ORE TESTING

The lectures treat of the use and purposes of all the machinery connected with the subject, supplemented with detail drawings.

There are complete testing works connected with the department where the student may see the working of, and handle for himself, crushers, rolls, Huntington mill, concentrating machinery, such as vanners, buddles, jigs, pan for amalgamation, settlers, reverberatory furnaces for oxidizing and oxidizing-chloridizing roasts, leaching and chlorination plants, as well as sizing apparatus and hydraulic separators. Sufficiently large amounts of ore are given to make the necessary tests upon the different machines, and the students report the best method of treatment. The first semester of the senior year is devoted to instruction and laboratory work, and is required of students both in mining and metallurgy.

The ore testing works meet educational as well as commercial needs.

Educational. The ore testing plant acquaints the student with the construction and manipulation of the principal typical machines used in the leading ore dressing establishments of the country. It is here that students in mining and metallurgical engineering get the requisite practical experience. They handle all machines and operate on sufficiently large amounts of material to determine the methods best suited to a given ore to extract the largest amount of metal with the least possible loss.

Commercial. Ore testing works are an important factor in mining and metallurgical projects. The commercial object is to determine the best method of treating a given ore so as to yield the largest percentage of the metal it contains at the least possible cost. Samples varying from 500 pounds to car load lots can be treated by various methods.

The ore testing works are located on the east bank of the Mississippi between the Great Northern and Northern Pacific railroads. Located at this point on the University campus, it offers the very best facilities for both educational and commercial purposes.

As the funds appropriated for the erection of such a plant were sufficient to purchase only the necessary machinery, the business men of Minneapolis generously provided a suitable building. This building, 94x66 feet, is built of brick and stone.

Machinery. The plant contains all the machinery necessary to illustrate the various processes of ore testing, viz.: A Bridgman mechanical sampler, size B; a link belt bucket elevator; a pulley feeder complete; a pair of 12½ x12 geared rolls complete; a four compartment spitzkasten; a three compartment Hartz jig; a Collum jig complete with cone for driving; a three and a half foot Huntington mill complete; a three stamp mill, 275-pound stamps; a five stamp mill, 850-pound stamps; a Challenge automatic feeder for five-stamp battery; a suspended Challenge feeder for three-stamp battery; a Tulloch feeder for Huntington mill; a single deck buddle, twelve feet in diameter; a four-foot plain belt Frue vanner; a Cammett concentrator; a Hooper pneumatic concentrator; a Century drop motion jig; a three-foot amalgamating pan; a five-foot settler; a Bruckner roasting furnace, with fire box on wheels; a chlorination barrel; a battery tightener; a two-horse power vertical boiler; a steam drying pan; three trommels, with driving arrangement and gears; a one-thousand pound Reedy elevator, complete with worm gear; two overhead crawls, each with eighty-foot track; one-ton pulley block; a quarter-ton pulley block; a scoop car, with flat wheels; two twenty-horse power electric motors; three MacDermott automatic samplers, etc.

FIELD WORK

At the end of junior year opportunity is given the student to study metallurgical operations at one or more smelting works. This work will begin about June 15th. Not over one week's time will be devoted to this work. The student must keep a diary and note in detail all work done, including sketches, etc. This diary must be submitted to the department not later than Sept. 10th before registering for senior year.

Prior to registration for the second semester senior year, the student must submit a type written report fully illustrated with sketches drawn to scale covering work completed in the field.

COURSE IN METALLURGY

FRESHMAN YEAR

FIRST SEMESTER

Chemistry 1, eight hours, Mr. Frary
Descriptive Geometry 3, one hour, Professor Kirchner
Drawing 1, six hours, Professor Kirchner and Assistants
Mathematics 1, five hours, Mr. Comstock
Mineralogy 1, eight hours, Professor Hall and Mr. Grout

SECOND SEMESTER

Chemistry 2, eight hours, Assistant Professor Nicholson and Mr. Frary
Descriptive Geometry 4, two hours, Professor Kirchner
Drawing 2, four hours, Professor Kirchner and Assistants
Mathematics 2, five hours, Mr. Comstock
Metallurgy 1, twelve hours, Professor Appleby, Assistant Professor Christianson and Assistant Professor Pease
Minerology 2, four hours, Professor Hall and Mr. Grout

SOPHOMORE YEAR

FIRST SEMESTER

Chemistry 3, eight hours, Professor Sidener
Drawing 5, eight hours, Professor Kirchner and Assistants
Mathematics 3, five hours, Professor Groat and Mr. Comstock
Metallurgy 3, three hours, Assistant Professor Christianson
Physics 1, four hours, Professor Jones and Mr. Kovarik

SECOND SEMESTER

Chemistry 5, eight hours, Professor Sidener
Drawing 6, four hours, Professor Kirchner and Assistants
Mathematics 4, five hours, Professor Groat and Mr. Comstock
Metallurgy 4, three hours, Assistant Professor Christianson
Mining 1, four hours, Assistant Professor McCarty
Physics 1, four hours, Professor Jones and Mr. Kovarik

JUNIOR YEAR

FIRST SEMESTER

Geology 3, two hours, Professor Hall
Geology 9, four hours, Mr. Grout
Experimental Engineering 1, four hours, Mr. Shoop
Mechanics 5, five hours, Professor Groat

Metallurgy 5, four hours, Assistant Professor Pease

Mining 2, five hours, Professor van Barneveld

Mining 3, five hours, Professor van Barneveld and Assistant Professor
McCarty

SECOND SEMESTER

Geology 10, four hours, Mr. Grout

Mechanics 6, five hours, Professor Groat

Experimental Engineering 2, four hours, Mr. Shoop

Metallurgy 6, four hours, Assistant Professor Pease

Mining 2, five hours, Professor van Barneveld

Mining 5, five hours, Assistant Professor McCarty

Mining 8, five hours, Assistant Professor McCarty

Mechanical Engineering 18, two hours, Professor Flather

Field work. Months of May, June, July and August.

Mine Surveying 7, Beginning about May 1st.

Six weeks

Professor van Barneveld

Assistant Professor McCarty

Metallurgy 8, one week

Professor Appleby

Assistant Professor Christianson

Assistant Professor Pease

Practical Mining 9, six weeks:

Professor van Barneveld,

Assistant Professor McCarty

SENIOR YEAR

FIRST SEMESTER

Chemistry 14, eight hours, Professor Sidener

Electrical Power, Electrical Engineering 4, six hours, Mr. Ryan

Geology 12, four hours, Professor Hall

Mechanics 7, five hours, Professor Groat

Mining 4, five hours, Professor van Barneveld

Metallurgy 2, ten hours, Professor Appleby, Assistant Professor Christianson and Assistant Professor Pease

SECOND SEMESTER

Chemistry 18, eight hours, Professor Sidener

Chemistry 16, six hours, Professor Frankforter and Mr. Frary

Experimental Engineering 9, four hours, Professor Kavanaugh

Mechanics 8, three hours, Professor Groat

Metallurgy 7, three hours, Assistant Professor Christianson

Metallurgy 9, four hours, Professor Appleby and Assistants

Mining 4, five hours, Professor van Barneveld

Courses of Instruction

CHEMISTRY

GEORGE B. FRANKFORTER, *Ph. D., Professor of Chemistry*

CHARLES F. SIDENER, *B. S., Professor of Chemistry*

EDWARD E. NICHOLSON, *M. A., Assistant Professor of Chemistry*

FRANCIS C. FRARY, *M. S., Instructor in Chemistry*

1. GENERAL AND QUALITATIVE ANALYSIS PROFESSOR NICHOLSON AND
MR. FRARY
Five credits (two lectures, six laboratory hours per week)
First semester
Required of freshmen.
The course includes special general chemistry and the reactions of the metals as applied to their separation and identification.
2. QUALITATIVE ANALYSIS PROFESSOR NICHOLSON AND MR. FRARY
Five credits (two lectures, six laboratory hours per week)
Open to students completing 1. Required of freshmen.
Second semester
The work in this course will include examination of alloys, minerals, slags and other compounds.
3. QUANTITATIVE ANALYSIS PROFESSOR SIDENER AND ASSISTANTS
Five credits (two lectures, six laboratory hours per week)
First semester
Open to students completing 2. Required of sophomores.
The course includes an introduction to quantitative and a beginning of gravimetric analysis.
5. VOLUMETRIC ANALYSIS PROFESSOR SIDENER AND ASSISTANTS
Five credits (two lectures, six laboratory hours per week)
Second semester
Open to students completing 3. Required of sophomores.
The course includes an introduction to volumetric determinations with a discussion of standard solutions and the necessary stoichiometric calculations.
14. SPECIAL PROBLEMS PROFESSOR SIDENER AND ASSISTANTS
Five credits (two lectures, six laboratory hours per week) First semester
Open to students completing 5. Required of seniors
The course includes the working out of various mineralogical technological and metallurgical problems, with work on ores of base metals, limestone, slags, etc.
16. ELECTRO-CHEMICAL ANALYSIS PROFESSOR FRANKFORTER AND MR. FRARY
Four credits (two lectures, four laboratory hours per week)
Second semester
Open to students completing 14. Required of seniors in Metallurgy.
The course includes the qualitative and quantitative separation of metals by electrolysis.

NOTE.—A credit is one recitation or lecture hour per week per semester.
Two laboratory hours are equal to one credit.

- 18. IRON AND STEEL ANALYSIS** PROFESSOR SIDENER AND ASSISTANTS
 Five credits (two lectures, six laboratory hours per week)
 Second semester
 Open to students completing 14. Required of seniors.
 The course includes the rapid determination of iron by the various methods, as well as the determination of associated elements, sulphur, phosphorus, silicon, manganese, carbon and others.

DRAWING AND DESCRIPTIVE GEOMETRY

WILLIAM H. KIRCHNER, B. S., *Professor of Drawing and Descriptive Geometry*

FRANK B. ROWLEY, B. S., M. E., *Instructor in Drawing*

NORMAN W. ROSE, M. E., *Instructor in Drawing*

L. W. MCKEEHAN, *Assistant in Descriptive Geometry*

1. **DRAWING** MR. ROSE, MR. MCKEEHAN AND MR. ROWLEY
 Three credits (six laboratory hours per week) First semester
 Required of freshmen.
 The elements of general drafting, mechanical drawing as a language. Lines, views, dimensions, standards, signs, abbreviations and explanatory notes.
 Sketching, lettering, tracing and blue printing. Representation of details of machines and structures, and the interpretation of working drawings.
2. **DRAWING** MR. ROSE, MR. MCKEEHAN AND MR. ROWLEY
 Two credits (four laboratory hours per week) Second semester
 Open to students completing 1. Required of freshmen.
 Continuation of Course 1 as outlined above.
3. **DESCRIPTIVE GEOMETRY** PROFESSOR KIRCHNER
 One credit (one recitation per week) First semester
 Required of freshmen.
 Projection—central and special cases; principles and applications, representation of lines, planes and solids, and of their relations; tangencies, intersections and developments. Recitations, lectures and solution of problems.
4. **DESCRIPTIVE GEOMETRY** PROFESSOR KIRCHNER
 Two credits (two recitation hours per week) Second semester
 Open to students completing 3. Required of freshmen.
 Continuation of Course 3 as outlined above.
5. **DRAFTING** PROFESSOR KIRCHNER AND ASSISTANTS
 Four credits (eight laboratory hours per week) First semester
 Open to students completing 4. Required of sophomores.
 Graphics, machine drafting, structural drafting and topography. Instruction in drafting room methods. Preparation required. Courses 1, 2, 3, and 4.
6. **DRAFTING** PROFESSOR KIRCHNER AND ASSISTANTS
 Two credits (four laboratory hours per week) Second semester
 Open to students completing 5. Required of sophomores.
 Continuation of Course 5 as outlined above.

ELECTRICAL ENGINEERING**GEORGE D. SHEPARDSON, M. A., M. E.,** *Professor of Electrical Engineering***WILLIAM T. RYAN, E. E.,** *Instructor in Electrical Engineering***4. ELECTRIC POWER****MR. RYAN**

Six credits (three lectures, six laboratory lectures hours per week)

First semester

Open to students completing Physics 1. Required of seniors.

Elements of theory and practice of electrical measurements, wiring, dynamos, motors and electric lighting

EXPERIMENTAL ENGINEERING**WILLIAM H. KAVANAUGH, M. E.,** *Professor of Experimental Engineering***CHARLES F. SHOOP, B. S.,** *Instructor in Experimental Engineering***1. STRENGTH OF MATERIALS****MR. SHOOP**

Two credits (four laboratory hours per week)

First semester

Open to students completing Mechanics 5. Required of juniors.

Laboratory work investigating the strength and physical qualities of iron, steel, brass, copper, belting, chains, beams, brick and stone.

2. STEAM LABORATORY**MR. SHOOP**

Two credits (four laboratory hours per week)

Second semester

Open to students completing 18. Required of juniors.

Exercises in valve setting, indicator practice, calibration of steam gauges, efficiency of screws and hoists.

9. EXPERIMENTAL LABORATORY**PROFESSOR KAVANAUGH**

Two credits (four laboratory hours per week)

Second semester

Open to students completing 2. Required of seniors.

Hydraulic measurements. Calibration of weirs, nozzles, meters and other hydraulic apparatus; calorimetry; tests of pumps, engines and boilers.

MINERALOGY AND GEOLOGY**CHRISTOPHER W. HALL, M.A.,** *Professor of Mineralogy and Geology***FRANK F. GROUT, B.S.,** *Instructor in Mineralogy***1. GENERAL MINERALOGY****MR. GROUT**

Six credits (four lectures, four laboratory hours per week)

First semester

Required of freshmen

The physical and chemical characters of minerals; a study of the native elements and the ores of the common metals; the occurrence and association of economic minerals.

Descriptive mineralogy and classification; rock-forming minerals; genetic relationships and distribution.

Laboratory work consists of tests illustrating the range of minerals and the application of chemical and blowpipe analyses to the determination of species; and introduction to the methods of quantitative blowpipe analysis; special topics; reference reading and discussions.

2. PHYSICAL MINERALOGY

MR. GROUT

Three credits (two lectures, two laboratory hours per week)

Open to students completing 1. Required of freshmen.

Second semester

An introduction to crystallography; physical characters of greatest service in rapid determination. Hand specimen practice preparatory to rock study.

3. PHYSICAL GEOLOGY

PROFESSOR HALL

Two credits (two lectures per week)

First semester

Open to students completing 2. Required of juniors.

1. Geodynamics, discussing the atmosphere, water, terrestrial heat, plants and animals as geological agents. 2. Structural geology, explaining stratification, displacements, dislocations, fractures, induced rock-structures and mineral veins in their relation to the arrangement of materials in the earth. 3. Physiographic geology, pointing out the more prominent earth features and discussing their origin, significance and the agencies affecting them. Field excursions are required. Scott's Introduction.

9. ELEMENTS OF ROCK STUDY

MR. GROUT

Two credits, (four laboratory hours per week)

First semester

Open to students completing 3. Required of juniors.

Structures, textures, mineral and chemical composition of rocks. A practical study of rock types, with laboratory and field practice. A study of their origin, occurrence, variation and alteration, with view to accurate description. Introduction to the use of the microscope. Kemp's Handbook of Rocks, and reference reading.

10. PETROGRAPHY

MR. GROUT

Two credits (four laboratory hours per week)

Second semester

Open to students completing 9. Required of juniors.

The application of optical study of minerals to the description of crystalline rocks. Rock structures as seen with a microscope. Alteration of rocks. The stratigraphic relation of rocks, and an examination of some Minnesota groups of crystalline rocks. Preparation of material for microscopic study, Lu Quer, Minerals in Rock Sections, and reference readings.

12. ORE DEPOSITS

PROFESSOR HALL

Four credits (four lectures per week)

First semester

Open to students completing 10. Required of seniors.

History of mineral discovery and development in the Americas; a discussion of the origin and distribution of ore deposits, embracing the chemical processes involved in their formation and subsequent alterations. A description of the geology and mineralogy of ore bodies, particularly those yielding gold, silver, copper, iron, lead and zinc. Kemp's Ore Deposits.

13. SPECIAL PROBLEMS

PROFESSOR HALL

Two credits (four laboratory hours per week)

Second semester

Open to students completing 12. Required of seniors in mining.

The investigation of problems, involving the field and laboratory work of some particular formation and reading incident to the study of the material collected. The methods of systematically recording and interpreting geological and mineralogical data as observed in the field; keeping of notebook, preparation of geological maps, profiles and sections will be taught.

MECHANICS AND MATHEMATICS

B. F. GROAT, B. S., *Professor of Mechanics and Mathematics*ELTING H. COMSTOCK, M. S., *Instructor in Mathematics*

1. **ALGEBRA AND TRIGONOMETRY** MR. COMSTOCK
 Five credits (five recitations per week) First semester
 Required of freshmen.
 Rational integral functions, factors and roots of general quadratic, factor and remainder theorems, factors and values of $f(x)$, graphs, cube roots of unity, progressions and notation, development of $f(x)$, and undetermined co-efficients, convergence, divergence, equivalence, exponential theorem, logarithmic series and logarithms, summation of series, derived functions, theory of equations, trigonometric ratios, right triangles, general definitions of functions, analytic relations, trigonometric equations, oblique triangles.
2. **ALGEBRA AND ANALYTIC GEOMETRY** MR. COMSTOCK
 Five credits (five recitations per week) Second semester
 Open to students completing 1. Required of freshmen.
 Spherical formulae and solution of spherical triangles, permutations and combinations, determinants, systems of co-ordinates, loci, straight line, transformation, equations of the conics, limits, areas and limits of sums, differentiation and integration of elementary forms, probabilities.
3. **ANALYTIC GEOMETRY AND INFINITESIMAL ANALYSIS** MR. COMSTOCK
 Five credits (five recitations per week) First semester
 Open to students completing 2. Required of sophomores.
 Properties of the conics, equation of 2d degree, higher plane curves, co-ordinates in space, point, plane, straight line, quadric surfaces, review of nature of differentiation and integration, elementary forms, geometric applications, successive derivatives, expansion of functions, indeterminate forms, rates, partial derivatives, maxima and minima, change of variable, applications to analytic geometry
4. **DIFFERENTIAL AND INTEGRAL CALCULUS** MR. COMSTOCK
 Five credits (five recitations per week) Second semester
 Open to students completing 3. Required of sophomores.
 Applications continued, rational fractions, rationalization, formulae of reduction, multiple integration, various systems of co-ordinates, approximate integration, some differential equations of mechanics, least squares.
5. **STATICS AND MECHANICS OF MATERIALS** PROFESSOR GROAT
 Five credits (five recitations and lectures per week) First semester
 Open to students completing 4 and Physics 1. Required of juniors.
 Mathematical conditions of equilibrium, frames, theory of elasticity, beams, shafts, columns, boiler plates, etc.
6. **KINETICS AND HYDRAULICS** PROFESSOR GROAT
 Five credits (five recitations and lectures per week) Second semester
 Open to students completing 5. Required of juniors.
 Motion of rigid bodies; numerous problems in work, power, energy, friction and hydraulics.
7. **WATER POWER** PROFESSOR GROAT
 Five credits (five recitations and lectures per week) First semester
 Open to students completing 6. Required of seniors.

Estimation of power to be developed at a power site. Dams. Riparian rights. Number and type of units to install. Speed control. Power houses. Appendages. Transmission.

8. THERMODYNAMICS

PROFESSOR GROAT

Three credits (three recitations and lectures per week) Second semester
Open to students completing 7. Required of seniors.
Properties of gases. Steam engine. Gas engine. Steam and gas turbines. Power plants. Pumping.

MECHANICAL ENGINEERING

JOHN J. FLATHER, Ph. B., M. E., *Professor of Mechanical Engineering*

18. STEAM ENGINE

PROFESSOR FLATHER

Two credits (two lectures per week) Second semester
Open to students completing Mechanics 5. Required of juniors.
Mechanics of the steam engine. Work in cylinder; effect of reciprocating parts; steam distribution. Mechanism of steam engines. A study of the details of modern steam engines. Valve and valve gears. A study of the slide valve, link motions and other reversing gear; automatic cut-off gears and the Zeuner diagram. The steam engine indicator. Principles and operation of the instruments, indicator rigging; indicator cards, compounding

METALLURGY

WILLIAM R. APPLEBY, M. A., *Professor of Metallurgy*

PETER CHRISTIANSON, B. S., E. M., *Assistant Professor of Assaying*

LEVI B. PEASE, M. S., *Assistant Professor of Metallurgy*

1. ASSAYING

PROFESSOR APPLEBY AND ASSISTANTS

8 credits (four lectures and eight laboratory hours per week) Second semester
Open to students completing Mineralogy 1. Required of freshmen.
Determination of values of ores, metallurgical products and bullion.

2. ORE TESTING

PROFESSOR APPLEBY AND ASSISTANTS

Six credits (two lectures and eight laboratory hours per week) First semester
Open to students completing 1 and Mining 5. Required of seniors.
Determination of methods of ore treatment, stamping, concentration, cyanidation, roasting, chlorination, lixiviation and amalgamation.

3. GENERAL METALLURGY AND METALLURGY OF IRON

ASSISTANT PROFESSOR

CHRISTIANSON

Three credits (three lectures per week) First semester
Open to students completing 1. Required of sophomores.
Including the subjects of combustion, fuels, refractory material and furnaces. Lectures and recitations on metallurgy of iron.

4. METALLURGY OF WROUGHT IRON AND STEEL

ASSISTANT PROFESSOR

CHRISTIANSON

Three credits (three lectures per week) Second semester

Open to students completing 3. Required of sophomores.
 Consideration of the principles of manufacture, details of plant construction and chemical and physical phenomena.

5. **METALLURGY OF THE BASE METALS** ASSISTANT PROFESSOR PEASE
 Four credits (four lectures per week) First semester
 Open to students completing 4. Required of juniors.
 Lead, copper, zinc and mercury. Consideration of smelting methods and principles involved refining methods.
6. **METALLURGY OF THE PRECIOUS METALS** ASSISTANT PROFESSOR PEASE
 Four credits (four lectures per week) Second semester
 Open to students completing 5. Required of juniors.
 Gold, silver and platinum. Methods and principles of cyanidation, chlorination, amalgamation and lixiviation as applied to the treatment of the above.
7. **ELECTRO-METALLURGY** ASSISTANT PROFESSOR CHRISTIANSON
 Three credits (three lectures per week) Second semester
 Open to students completing 6. Required of seniors in Metallurgy.
 This course considers the treatment of ores by electricity, as well as electrolytic separation and refining of metals.
8. **FIELD WORK IN METALLURGY** PROFESSOR APPLEBY AND ASSISTANTS
 Two credits (eight hours per day in field for seven days)
June following second semester
 Open to students completing 6. Required of juniors.
 Study of metallurgical operations at smelters and mills. Detail report is required covering plants visited.
9. **THESIS AND SPECIFICATIONS** PROFESSOR APPLEBY AND ASSISTANTS
 Four credits (four hours conferences and laboratory) Second semester
 Open to students completing 8. Required of seniors in Metallurgy.
 Detail investigations of ore treatment, with report including designs and specifications for suitable plants.

MINING ENGINEERING

CHARLES E. VAN BARNEVELD, B.A., Sc., E.M., *Professor of Mining Engineering*

EDWARD P. McCARTY, E.M., *Assistant Professor of Mining*

1. **MINING** ASSISTANT PROFESSOR McCARTY
 Four credits (four lectures per week)
 Open to sophomores in regular standing. Required of sophomores.
 Explosives, blasting, air compressors and quarrying.
2. **MINING** PROFESSOR VAN BARNEVELD
 Five credits (five lectures per week) First and second semester
 Open to those who have completed 1. Required of juniors.
 Mode of occurrence of ore bodies; prospecting, shaft-sinking, tunneling, drifting, stoping, timbering. Methods of metal mining. Methods of coal mining. Hydraulic mining.
3. **MINE SURVEYING** PROFESSOR VAN BARNEVELD AND ASSISTANT
 Five credits (five lectures per week) First semester
 Open to those who have taken mathematics 1, 2, 3 and 4 and mining 1. Required of juniors.

Computations, platting and problems with special reference to mine surveying.

4. **MINING AND MINING ENGINEERING** PROFESSOR VAN BARNEVELD
 Five credits (five lectures per week) First and second semester
 Open to those who have completed mining 2 and 3. Required of seniors.
 Mine management. The examination of a mining property.
 Sampling ore reserves, etc. Mine accounts. Mine accidents.
 Mining law. Mining machinery, underground transportation,
 hoisting, pumping and ventilation. Electricity applied to
 mining.
5. **ORE DRESSING** ASSISTANT PROFESSOR MCCARTY
 Five credits (five lecture hours per week) Second semester
 Open to those having completed sophomore work. Required of juniors.
 Mechanical preparation of ore for the market, for metallurgical
 treatment, etc.
6. **DESIGNS AND SPECIFICATIONS** PROFESSOR VAN BARNEVELD AND ASSISTANT
 Four credits (eight laboratory hours per week) Second semester
 Open only to seniors in regular standing. Required of seniors.
 Designs of mine cars, skips, head-frames, etc., in connection with
 thesis work.
7. **FIELD WORK** PROFESSOR VAN BARNEVELD AND ASSISTANT
 Eight credits (eight hours a day for six weeks) Second semester
 Open to those who have completed mining 3. Required of juniors.
 Practice in plane surveying during month of May. Practice in
 underground mine surveying during first two weeks of June.
8. **MINE MAPPING** ASSISTANT PROFESSOR MCCARTY
 Two and one-half credits (five laboratory hours per week)
 Second semester
 Open to those who have completed 3. Required of juniors.
9. **PRACTICAL MINING** PROFESSOR VAN BARNEVELD AND ASSISTANT
 Eight credits (eight hours per day, six weeks) Summer vacation
 Open to those who have completed 1, 2, 3, 7 and 8. Required of juniors.
 Study of mining operations. Mine plant and equipment and
 practical mining work at a mine to be selected by department
 during months of July and August. Open to those who have
 completed 1, 2, 3 and 8.
10. **THESIS** PROFESSOR VAN BARNEVELD AND ASSISTANT
 Two and four credits (two and four hours conferences)
 First and second semesters
 Open only to seniors in regular standing. Required of seniors.
 Conference with individual students. This work is based upon
 a review of the preceding technical work and field work.

PHYSICS

FREDERICK S. JONES, M.A., *Professor of Physics*

ALOIS F. KOVARIK, M.A., *Instructor in Physics*

1. **GENERAL PHYSICS** PROFESSOR JONES AND MR. KOVARIK
 Four credits (four lectures and recitations per week)
 First and second semester
 Open to students completing mathematics 2. Required of sopho-
 mores.
 Recitations and experimental lectures.

THE SCHOOL of CHEMISTRY

School of Chemistry

FACULTY

CYRUS NORTHROP, LL. D., *President*

GEORGE B. FRANKFORTER, M. A., Ph. D., *Dean and Professor of Chemistry*

WILLIAM R. APPLEBY, M. A., *Professor of Metallurgy*

GEORGE N. BAUER, Ph. D., *Professor of Mathematics*

WILLIAM E. BROOKE, B.C.E., M.A., *Professor of Mathematics*

WILLIAM H. BUSSEY, Ph.D., *Assistant Professor of Mathematics*

PETER CHRISTIANSON, B.S., E.M., *Assistant Professor of Assaying*

FREDERIC CLEMENTS, Ph.D., *Professor of Botany*

IRA H. DERBY, B. A., *Assistant Professor of Chemistry*

JOHN F. DOWNEY, M. A., C. E., *Professor of Mathematics*

HENRY T. EDDY, C.E., Ph.D., LL.D., *Professor of Mathematics and Mechanics*

JOHN J. FLATHER, Ph. B., M. E., *Professor of Mechanical Engineering*

JOHN H. GRAY, Ph.D., *Professor of Political Science*

CHRISTOPHER W. HALL, M. A., *Professor of Geology and Mineralogy*

EVERHART P. HARDING, M. S., Ph. D., *Assistant Professor of Chemistry*

FREDERICK S. JONES, M. A., *Professor of Physics*

HANS JUERGENSEN, *Assistant Professor of German*

WILLIAM H. KAVANAUGH, M. E., *Professor of Experimental Engineering*

WILLIAM KIRCHNER, B.S., *Professor of Drawing*

J. G. MOORE, B. A., *Professor of German*

BURT L. NEWKIRK, Ph. D., *Assistant Professor of Mathematics and Mechanics*

EDWARD E. NICHOLSON, M. A., *Assistant Professor of Chemistry*

LEVI B. PEASE, B. Sc. Chem., M.S., *Assistant Professor in Metallurgy*

EDWARD VAN DYKE ROBINSON, Ph.D., *Professor of Economics*

CARL OTTO ROSENDAHL, Ph.D., *Assistant Professor of Botany*

CARL SCHLENKER, B. A., *Professor of German*

GEORGE D. SHEPARDSON, M. A., M. E., *Professor of Electrical Engineering*

CHARLES F. SIDENER, B. S., *Professor of Chemistry*

EDWARD SIGERFOOS, Ph. B., Capt. U. S. A., *Professor of Military Science*

FRANK W. SPRINGER, E. E., *Professor of Electrical Engineering*

JOSEPHINE E. TILDEN, M.S., *Assistant Professor of Botany*

CHARLES E. VAN BARNEVELD, B. A., Sc., E. M., *Professor of Mining Engineering*

MATILDA WILKIN, M.L., *Assistant Professor of German*

JOHN ZELNY, B. S., Ph. D., *Professor of Physics*

WALTER BADGER, B. A., *Instructor in Chemistry*

OSCAR BURKHARD, M.A., *Instructor in German*

LILIAN COHEN, M. A., *Instructor in Chemistry*

LOUIS J. COOKE, M.D., *Director of the Gymnasium*

HANS DALAKER, B.S., *Instructor in Mathematics*

OSCAR W. FIRKINS, M.A., *Instructor in Rhetoric*

FRANCIS C. FRARY, M. S., *Instructor in Chemistry*

FRANK F. GROUT, B. S., *Instructor in Mineralogy*

JOHN A. HANDY, Ph. C., *Instructor in Chemistry*

ALOIS F. KOVARIK, B.A., *Instructor in Physics*

JAMES E. MANCHESTER, Sc. D., *Instructor in Mathematics*

JOHN C. MARTENIS, M. E., *Instructor in Machine Design*

RAYMOND V. PHELAN, Ph.B., *Instructor in Economics*

WILLIAM H. RICHARDS, *Instructor in Shop Work*

NORMAN W. ROSE, M.E., *Instructor in Drawing*

FRANK B. ROWLEY, B.S., M.E., *Instructor in Drawing*

WILLIAM RYAN, E.E., *Instructor in Electrical Engineering*

JAMES ZIMMERMAN, B.A., *Instructor in Chemistry*

WILLIAM METHLEY, *Lecture Assistant*

COMMITTEES

Enrollment and Students' Work.—George B. Frankforter, C. F. Sidener, E. P. Harding, E. E. Nicholson.

Curriculum.—George B. Frankforter, C. F. Sidener, E. E. Nicholson, Ira H. Derby.

Program.—E. P. Harding, F. C. Frary, Lillian Cohen.

ADMISSION

Examinations for admission will be held at the beginning of the year. See calendar and program of examinations.

No student will be registered for first semester's work after September 26th, 1908, or for second semester's work after February 13th, 1909.

All applicants should present themselves to the registrar who will furnish them with application blanks and directions covering examinations and registration.

GENERAL REGULATIONS GOVERNING ADMISSION

- I. Students will be admitted to the freshman class on passing the regular entrance examinations.
- II. No student will be admitted if conditioned in more than three half-year subjects, or their equivalent. No conditions, however, in entrance mathematics shall be allowed except upon special recommendation of the department of mathematics.
- III. Graduates of any Minnesota State high school will be admitted without entrance examinations, provided:
 - (1) That the school maintain a full four-year course of high school work.
 - (2) That the applicant present to the registrar the principal's certificate showing the satisfactory completion of all the studies required for admission to the desired University course.
- IV. Graduates of Minnesota State high schools who are deficient in not more than three half-year subjects or their equivalent, may be excused from entrance examinations in such subjects as the enrollment committee may decide upon; such candidates should present themselves to that committee not later than Tuesday of examination week.
- V. Graduates of Minnesota State high schools whose principal's certificate shows them to be deficient in more than three half-year subjects or their equivalent, even though they have made such additional preparation as they deem necessary, must take, nevertheless, the regular entrance examination in all subjects, as provided in sections I and II unless excused by vote of the faculty; and persons wishing to present reasons for such excuse should report to the enrollment committee not later than Tuesday of examination week.
- VI. Graduates of the advanced courses of Minnesota normal schools will be admitted upon the same terms as graduates of State high schools.
- VII. Any Minnesota high school or academy not under supervision of the State High School Board, but requiring for graduation a four-year course, exclusive of the common school branches, conforming essen-

tially in distribution of time to the entrance requirements of at least one of the University courses, will, upon application, be inspected by a committee, and, after favorable recommendation, may be accredited by the faculty in all respects as are the State high schools, provided:

(1) That the school be open to inspection at any time by the University;

(2) That it take such supplementary examinations as may be prescribed from time to time.

VIII. Graduates from schools in other states, whose diplomas admit to reputable colleges in the state in which the school is located, will be received subject to the regulations that apply to graduates of Minnesota State high schools.

IX. Applicants from schools not coming within any of the above classes must take the regular entrance examinations or present State High School Board certificates.

In all cases the faculty reserves the right to require a student to take supplementary examinations if he does not sustain himself creditably in his course.

The enrollment committee will meet every day during the week commencing September 7th, in School of Chemistry Building, room 5, at 9 o'clock a. m.

REQUIREMENTS FOR ADMISSION TO THE FRESHMAN CLASS

N. B.—Time element, as indicated with each subject, is essential:—

English, four years, including:

(a) Classics (b) Principles of composition

(c) Practice in written expression

Algebra, elementary, one year

Algebra, higher, one-half year

Geometry, plane, one year

Geometry, solid, one-half year

Chemistry, one year

In addition to the above-named required subjects, for which no substitutes will be accepted, the student shall present evidence of having completed work in any of the following subjects, entitling him to eight year-credits:

Latin, four years

Grammar, one year

Caesar, four books, one year

Cicero, six orations, one year

Virgil, six books, one year

Greek, two years

Grammar, one year

Anabasis, four books, one year

German, two years

Grammar, one year

Literature, one year

French, two years

Grammar, one year

Literature, one year

Spanish, two years

Grammar, one year

Literature, one year

History, Ancient, to Charlemagne, one year

Modern, from Charlemagne, one year

English, one half year

Senior American, one half year

American Government, one half year

Political Economy, one half year

Physics, one year

Botany, one half or one year

Zoology, one half or one year

Astronomy, one half year

Geology, one half year

Physiography, one half year

Commercial Geography, one half or one year

ADVANCED STANDING

The University accepts records from all reputable colleges for credit to advanced standing. Such records are accepted as far as they are equivalent to the work done in this University. In bringing records from other institutions, the certificate must be on the official blank of the institution granting the certificate, and should show:

1. The subjects studied; if a language, the work read, etc.
2. The time spent upon each subject.
3. Ground covered in laboratory work in case of laboratory subjects.
4. The result—it is sufficient to state that the subject was creditably completed.

Records from institutions whose entrance requirements are not essentially equivalent to the requirements of the University, will not be accepted unquestioned; the credit to be allowed will be decided in individual cases by the enrollment committee.

The University of Minnesota

DAILY ROUTINE

The morning session begins at 8:30 o'clock; a general assembly of the faculty and students is held each day at 10:25 o'clock, at which there are brief and simple religious exercises. Work extends through six days of the week.

FEES

All students in the college, who are residents of the state, are charged an incidental fee of fifteen dollars a semester. Non-residents are charged double the fee required of residents of the state, or thirty dollars a semester. No reduction is made for late entrance or for leaving before the end of the semester. Save in the case of the first registration, the incidental fee is increased 25 cents for each day's delay in registration, beginning with the day set for recitations to begin. In addition to this fee, students who take work in laboratories are charged a sum sufficient to cover the cost of material and breakage.

GENERAL STATEMENT

The two four-year courses in chemistry are designed for those who wish to become teachers of chemistry, analysts, investigators, manufacturing and applied chemists. The course in analytical chemistry is arranged especially for teachers, analysts and general scientists. The course in engineering chemistry is intended for those who would become manufacturing and applied chemists and chemical technologists. The courses here presented include general, organic, analytical, technical, theoretical and applied chemistry. Besides chemistry, extended work is offered in physics, mathematics, metallurgy, mineralogy, crystallography, geology, engineering, botany, language and drawing.

Electives are offered in the senior year in order to give the students an opportunity of selecting subjects of special importance to them, but which are not included in the regular courses. The degree of Bachelor of Science in Chemistry is offered to those who complete the course in Analytical Chemistry and Bachelor of Science in Chemical Engineering to those who complete the course in Applied Chemistry.

EQUIPMENT

Laboratories. The building formerly known as Science Hall has been completely remodeled to meet the needs of the department of chemistry. The building is 198 by 78 feet, and consists of several large laboratories well equipped for a wide range of chemical work. The general laboratory is located on the first floor and is large enough to accommodate 350 students. The laboratory tables are arranged with cupboards, drawers and

locks and supplied with gas and water. Connected with this laboratory by means of sliding windows, is a preparation room which is directly joined to the general store room. The remaining part of this floor is given to cloak rooms, furnace and motor rooms and a large lecture room with a gallery designed to seat comfortably 350 students. The qualitative laboratory located on the second floor, is arranged with tables similar to those of the general laboratory and will accommodate 250 students. The library and three technical laboratories are likewise on this floor. The third floor contains the quantitative laboratory large enough to accommodate 120 students. Directly connected with this laboratory are the balance, preparation, evaporation and drying rooms. There are also on this floor, six special laboratories, an organic laboratory, a physical laboratory, a lecture room and a museum. There is a suite of rooms on the fourth floor entirely given to photography. The second building, which is one of the units in the medical quadrangle, contains three large laboratories with a combined floor space of 3,800 square feet. It is devoted largely to organic chemistry, pharmaceutical chemistry and toxicology.

Library. The chemical library contains complete sets of many of the important journals. It contains besides these special sets, a well-represented list of analytical and technical works, as well as many rare old works of great historical value. Most of the important journals are taken, thus enabling the student to keep abreast of the times. All books are easily accessible, with only the necessary restrictions to guard against injury and loss.

American Chemical Society. A local section of the American Chemical Society has been organized in Minnesota with headquarters at the University.

The Camera Club is an organization of instructors and students interested in photography and photographic chemistry.

INDUSTRIAL PHOTOGRAPHY

The photographic laboratories are equipped with process lenses, copying cameras, printing frames, presses, etching tubs, etc., for the production of half tone zinc etching and color work. Students who desire to become expert photo-engravers may specialize in this work during the senior year.

INDUSTRIAL MUSEUM

Considerable space is given to a collection in industrial, technical and applied chemistry. There is a large collection of chemicals, with specimens of each in the various stages of preparation and purification; a collection of nearly all the elements, with most of their important salts; a

large number of mining and metallurgical specimens, including most of the important ores, together with many rare specimens in crystallography. The collections of coals and petroleums are especially valuable for lecture and technical work. There is a large collection of dyes, organic and inorganic, mordants, textiles, and other materials used in dyeing and bleaching, with a rapidly increasing collection of clays and materials used in making glass, earthenware, porcelain and brick. A collection of furnace products, models and series of charts, blue prints and photographs illustrating a wide range of technical and chemical processes is being added.

Courses of Study

ANALYTICAL CHEMISTRY

FRESHMAN YEAR

First Semester

Chemistry 3, seven hours, Assistant Professor Nicholson, Mr. Frary, and Assistants

Drawing 7, six hours, Professor Kirchner, Mr. Rose and Mr. Rowley

Mathematics 3, three hours, Professor Bauer, Assistant Professor Bussey

Mineralogy 1, six hours, Professor Hall and Mr. Grout

Rhetoric 1, three hours, Mr. Firkins, Mr. Nichols, Miss Maley, Miss Griffith, Miss Whitney

Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

Gymnasium, one hour, Dr. Cooke

Second Semester

Metallurgy 1, twelve hours, Professor Appleby, Assistant Professor Christianson, Assistant Professor Pease

Chemistry 3, seven hours, Assistant Professor Nicholson, Mr. Frary and Assistants

Drawing 7, six hours, Professor Kirchner, Mr. Rose and Mr. Rowley

Mathematics 4, three hours, Professor Bauer, Assistant Professor Bussey, Dr. Manchester, Mr. Dalaker and Mr. Shumway

Rhetoric 1, three hours, Mr. Firkins, Mr. Nichols, Miss Maley, Miss Griffith and Miss Whitney

Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

Gymnasium, one hour, Dr. Cooke

SOPHOMORE YEAR

First Semester

Botany 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors

Chemistry 4, eight hours, Professor Sidener and Assistants

Economics 1, three hours, Professor Robinson and Dr. Phelan

German 1 or 4, three or five hours, Professor Schlenker, Assistant Professors Wilkin and Juergensen, Mr. Burkhard and Mr. Williams

Chemistry 20, six hours, Assistant Professor Harding

Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

Second Semester

Botany 1, six hours, Professor Clements, Assistant Professors Tilden and Rosendahl, and Instructors

Chemistry 5, four hours, Professor Sidener and Assistants

Chemistry 6, twelve hours, Professor Frankforter, Assistant Professor Derby, and Mr. Handy

Economics (elective), three hours, Professor Robinson and Dr. Phelan

German 1 or 4, three or five hours, Professor Schlenker, Assistant Professors Wilkin and Juergensen, Mr. Burkhard and Mr. Williams

Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

JUNIOR YEAR

First Semester

Chemistry 12, five hours, Assistant Professor Nicholson

Chemistry 10, six hours, Assistant Professor Harding

Economics (elective), three hours, Professor Gray

Geology 1, three hours, Professor Hall

Metallurgy 3, three hours, Assistant Professor Christianson

Physics 1, three hours, Professor John Zeleny

Physics 2, two hours, Mr. Kovarik

Chemistry 23, four hours, Professor Sidener

Second Semester

Chemistry 8, two hours, Miss Cohen

Chemistry 7, two hours, Assistant Professor Derby

Economics (elective), three hours, Professor Gray

Chemistry 18, seven hours, Professor Sidener and Assistants

Chemistry 19, six hours, Professor Sidener and Assistants

Metallurgy 4, three hours, Assistant Professor Christianson

Physics 3, three hours, Professor John Zeleny

Physics 4, two hours, Mr. Kovarik

SENIOR YEAR

First Semester

Chemistry 13, five hours, Mr. Frary

Chemistry 24, seven hours, Assistant Professor Derby

Geology 5, six hours, Mr. Grout

Chemistry 11, seven hours, Assistant Professor Harding

Metallurgy 5, four hours, Assistant Professor Pease

Chemistry 9, five hours, Professor Frankforter

Thesis

Second Semester

Chemistry 22, two hours, Professor Frankforter

Chemistry 15, four hours, Mr. Frary

Chemistry 21, two hours, Miss Cohen

Chemistry 16, four hours, Mr. Frary

Chemistry 11, seven hours, Assistant Professor Harding

Metallurgy 6, four hours, Assistant Professor Pease

Chemistry 17, four hours, Assistant Professor Harding

Thesis

APPLIED CHEMISTRY

FRESHMAN YEAR

First Semester

Chemistry 3, seven hours, Assistant Professor Nicholson, Mr. Frary and Assistants

Drawing 1 and 3, six hours, Professor Kirchner, Mr. Rose and Mr. Rowley

German 1 or 4, three or five hours, Professor Schlenker, Assistant Professors Wilkin and Juergensen, Mr. Burkhard and Mr. Williams

Mathematics 3, three hours, Professor Bauer, Assistant Professor Bussey, Dr. Manchester, Mr. Dalaker and Mr. Shumway

Rhetoric 1, three hours, Mr. Firkins, Mr. Nichols, Miss Maley, Miss Griffith, Miss Whitney

Mechanical Engineering 1, eight hours, Mr. Richards

Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

Second Semester

Chemistry 3, seven hours, Assistant Professor Nicholson, Mr. Frary and Assistants

Drawing 2 and 4, six hours, Professor Kirchner, Mr. Rose and Mr. Rowley

German 1 or 4, three or five hours, Professor Schlenker, Assistant Professor Wilkin and Juergensen, Mr. Burkhard and Mr. Williams

Mathematics 4, five hours, Professor Bauer, Assistant Professor Bussey

Rhetoric 1, three hours, Mr. Firkins, Mr. Nichols, Miss Maley, Miss Griffith, Miss Whitney

Mechanical Engineering 1, eight hours, Mr. Richards

Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

SOPHOMORE YEAR

First Semester

Chemistry 4, eight hours, Professor Sidener and Assistants

Drawing 5, eight hours, Professor Kirchner, Mr. Rose and Mr. Rowley

Economics 1, three hours, Professor Robinson, Dr. Phelan

Mathematics 5, three hours, Professor Bauer

Physics 1, three hours, Professor John Zeleny

Physics 2, one hour, Mr. Kovarik

Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

Second Semester

Chemistry 5, four hours, Professor Sidener and Assistants

Drawing 5, four hours, Professor Kirchner

Economics (elective), three hours, Professor Robinson and Dr. Phelan

Mathematics 6, five hours, Professor Bauer

Physics 3, three hours, Professor John Zeleny

Physics 4, two hours, Mr. Kovarik

Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.

JUNIOR YEAR

First Semester

Electric Power 5, three hours, Mr. Ryan

Machine Design 12, two hours, Professor Flather, Mr. Martenis

Mechanical Laboratory 1, two hours, Professor Kavanaugh, Mr. Shoop

Mechanics 7, five hours, Professor Eddy, Assistant Professor Brooke, Assistant Professor Newkirk

Physics 5, six hours, Professor Jones

Second Semester

Chemistry 6, twelve hours, Professor Frankforter

Electric Power 5, three hours, Mr. Ryan

Mechanics 8, five hours, Professor Eddy

SENIOR YEAR

First Semester

Chemistry 13, five hours, Mr. Frary

Economics (elective), three hours, Professor Gray

Chemistry 10, six hours, Assistant Professor Harding
Metallurgy 3, three hours, Assistant Professor Christianson
Chemistry 9, five hours, Professor Frankforter
Thesis, five hours

Second Semester

Chemistry 13, five hours, Mr. Frary
Economics (elective), three hours, Professor Gray
Chemistry 18, seven hours, Professor Sidener and Assistants
Metallurgy 4, three hours, Assistant Professor Christianson
Thesis, five hours

FIVE YEAR COURSE IN ARTS AND CHEMISTRY

The degree bachelor of arts will be conferred upon any student who completes the work prescribed in the first four years of the following course, provided that at least one long course shall be chosen from each of the following groups.

- (a) English, French, German, Greek, Latin, Rhetoric.
- (b) Animal Biology, Astronomy, Botany, Chemistry, Mineralogy, Physics.
- (c) History, Philosophy, Political Science and Sociology.

A long course means an amount of work equivalent to not less than six hours per week in one department for one year.

The degree bachelor of science in chemistry will be conferred upon the completion of the fifth year of the course.

FIVE YEAR COURSE IN ARTS AND CHEMISTRY

FIRST YEAR

First Semester

Chemistry 3, seven hours, Assistant Professor Nicholson, Mr. Frary and Assistants
Drawing 5, six hours, Professor Kirchner, Mr. Rose and Mr. Rowley
Mathematics 3, three hours, Professor Bauer, Assistant Professor Bussey
Mineralogy 1, six hours, Professor Hall and Mr. Grout
Rhetoric 1, three hours, Mr. Firkins, Mr. Nichols, Miss Maley, Miss Griffith, Miss Whitney
Military Drill, three hours, Captain Edward Sigerfoos, U. S. A.
Gymnasium, one hour, Dr. Cooke

Second Semester

Metallurgy 1, twelve hours, Professor Appleby, Assistant Professor Christianson, Assistant Professor Pease

tially in distribution of time to the entrance requirements of at least one of the University courses, will, upon application, be inspected by a committee, and, after favorable recommendation, may be accredited by the faculty in all respects as are the State high schools, provided:

(1) That the school be open to inspection at any time by the University;

(2) That it take such supplementary examinations as may be prescribed from time to time.

VIII. Graduates from schools in other states, whose diplomas admit to reputable colleges in the state in which the school is located, will be received subject to the regulations that apply to graduates of Minnesota State high schools.

IX. Applicants from schools not coming within any of the above classes must take the regular entrance examinations or present State High School Board certificates.

In all cases the faculty reserves the right to require a student to take supplementary examinations if he does not sustain himself creditably in his course.

The enrollment committee will meet every day during the week commencing September 7th, in School of Chemistry Building, room 5, at 9 o'clock a. m.

REQUIREMENTS FOR ADMISSION TO THE FRESHMAN CLASS

N. B.—Time element, as indicated with each subject, is essential:—

English, four years, including:

(a) Classics (b) Principles of composition

(c) Practice in written expression

Algebra, elementary, one year

Algebra, higher, one-half year

Geometry, plane, one year

Geometry, solid, one-half year

Chemistry, one year

In addition to the above-named required subjects, for which no substitutes will be accepted, the student shall present evidence of having completed work in any of the following subjects, entitling him to eight year-credits:

Latin, four years

Grammar, one year

Caesar, four books, one year

Cicero, six orations, one year

Virgil, six books, one year

Chemistry 7, two hours, Assistant Professor Derby

Physics 3, three hours, Professor John Zeleny

Physics 4, one hour, Mr. Kovarik

Electives in College of Science, Literature and the Arts, eight hours

FOURTH YEAR

First Semester

Chemistry 12, five hours, Assistant Professor Nicholson

Chemistry 10, six hours, Assistant Professor Harding

Chemistry 23, four hours, Professor Sidener

Economics (elective), three hours, Professor Gray

Geology 1, three hours, Professor Hall

Metallurgy 3, three hours, Assistant Professor Christianson

Second Semester

Chemistry 8, two hours, Miss Cohen

Chemistry 7, two hours, Assistant Professor Derby

Economics (elective), three hours, Professor Gray

Chemistry 18, seven hours, Professor Sidener and Assistants

Chemistry 19, six hours, Professor Sidener and Assistants

Metallurgy 4, three hours, Assistant Professor Christianson

FIFTH YEAR

First Semester

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Chemistry 13, five hours, Mr. Frary

Chemistry 24, seven hours, Assistant Professor Derby

Geology 5, three hours, Mr. Grout

Chemistry 11, seven hours, Assistant Professor Harding

Metallurgy 5, four hours, Assistant Professor Pease

Chemistry 9, five hours, Professor Frankforter

Thesis

Second Semester

Chemistry 22, two hours, Professor Frankforter

Chemistry 15, four hours, Mr. Frary

Chemistry 21, two hours, Miss Cohen

Chemistry 16, four hours, Mr. Frary

Chemistry 11, seven hours, Assistant Professor Harding

Metallurgy 6, four hours, Assistant Professor Pease

Chemistry 17, four hours, Assistant Professor Harding

Thesis

BOTANY

FREDERIC CLEMENTS, Ph. D., *Professor of Botany*

CARL OTTO ROSENDAHL, *Assistant Professor of Botany*

JOSEPHINE E. TILDEN, M.S., *Assistant Professor of Botany*

FREDERICK K. BUTTERS, M.S., *Instructor in Botany*

NED L. HUFF, M.A., *Instructor in Botany*

1. GENERAL BOTANY

PROFESSOR CLEMENTS, ASSISTANT PROFESSORS

TILDEN AND ROSENDAHL, MR. HUFF AND MR. BUTTERS

Six credits (three hours laboratory, three lectures per week)

First and second semesters

Open to all.

Both semesters must be completed before credit is given for the first semester.

A general survey of the subject, comprising laboratory study of the evolution and relationships of plants, greenhouse study of their behavior and structure, and fieldwork in the identification and distribution of flowering plants. Lectures and quizzes, laboratory, greenhouse and field work.

2. ADVANCED BOTANY

PROFESSOR CLEMENTS, ASSISTANT PROFESSORS

TILDEN AND ROSENDAHL

Six credits (three hours laboratory, three lectures per week)

First and second semesters

Open to students who have completed course 1.

A study of the structure and classification of the great groups of plants, based on identification; the details of cell-division, of the formation of tissues and of reproduction; and the general relations of the plant to the physical factors of its home. Lectures and quizzes, laboratory, greenhouse and field work.

13. INDUSTRIAL BOTANY

ASSISTANT PROFESSOR TILDEN

Six credits (six hours per week)

Both semesters

Open to technical students who have completed course 1.

A study of the origin, distribution and cultivation of plants yielding products of economic value, the nature and use of these products, and the processes by which they are obtained from the plants. Lectures, demonstrations, topics and laboratory work.

15. BOTANICAL MICROCHEMISTRY

PROFESSOR CLEMENTS

Three credits (six hours per week)

Both semesters

Open to those who have completed course 1.

This course is designed especially for students in the School of Chemistry. It comprises a microscopical study by means of stains and reagents of the nature and structure of plant substances, in the natural condition as well as in the finished product. Lectures, laboratory and reference work.

CHEMISTRY

GEORGE B. FRANKFORTER, M.A., Ph.D., *Dean and Professor of Chemistry*

CHARLES F. SIDENER, B.S., *Professor of Chemistry*

IRA H. DERBY, B.A., *Assistant Professor of Chemistry*

EVERHART P. HARDING, M.S., Ph.D., *Assistant Professor of Chemistry*

EDWARD E. NICHOLSON, M.A., *Assistant Professor of Chemistry*

WALTER BADGER, B.A., *Instructor in Chemistry*
 LILIAN COHEN, M.A., *Instructor in Chemistry*
 FRANCIS C. FRARY, M.S., *Instructor in Chemistry*
 JOHN A. HANDY, Ph.C., *Instructor in Chemistry*
 JAMES ZIMMERMAN, B.A., *Instructor in Chemistry*

FOR UNDERGRADUATES

1. **GENERAL CHEMISTRY** MISS COHEN, MR. BADGER AND ASSISTANT
 Six credits (two lectures, four hours laboratory per week)
First and second semester
 No prerequisite.
 The course includes a study of the chemical properties of the metallic and non-metallic elements, with a brief introduction to organic chemistry.
2. **ADVANCED GENERAL CHEMISTRY** PROFESSOR FRANKFORTER, MISS COHEN, MR. BADGER AND ASSISTANT
 Six credits (two lectures, four hours laboratory per week)
First and second semester
 Open to those who have had an elementary course in chemistry.
 The course includes besides descriptive and metallurgical chemistry, an introduction to physical and organic chemistry.
3. **QUALITATIVE ANALYSIS** ASSISTANT PROFESSOR NICHOLSON, MR. FRARY AND ASSISTANT
 Six credits (one lecture, six hours laboratory per week)
First and second semester
 Open to those who have completed course 1 or 2.
 The course includes the general reactions of the metals and acids with their qualitative separation. Besides this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.
4. **GRAVIMETRIC ANALYSIS** PROFESSOR SIDENER AND ASSISTANT
 Four credits (two lectures, six hours laboratory per week)
First semester
 Open to those who have completed course 3.
 The course includes an introduction to quantitative and a beginning of gravimetric analysis.
5. **VOLUMETRIC ANALYSIS** PROFESSOR SIDENER AND ASSISTANT
 Two credits (one lecture, three hours laboratory per week)
Second semester
 Open to those who have completed course 4.
 The course includes an introduction to volumetric analysis with a discussion of standard solutions and the necessary stoichiometric calculations.
6. **ORGANIC CHEMISTRY** PROFESSOR FRANKFORTER, ASSISTANT PROFESSOR DERBY, MR. HANDY AND ASSISTANT
 Six credits (four lectures, eight hours laboratory per week)
Second semester
 Open to those who have completed course 3.
 This course includes the aliphatic and the aromatic series with the preparation of the more important compounds.
7. **THEORETICAL CHEMISTRY** ASSISTANT PROFESSOR DERBY
 Two credits (one lecture and one recitation per week)
Second semester
 Open to those who have completed course 6.

The course involves a study of the most important theories which co-ordinate and unify chemical and physico-chemical phenomena.

8. **HISTORY OF CHEMISTRY** **MISS COHEN**
Two credits (one lecture and one recitation per week)
Second semester
Open to those who have completed course 6.
This course includes a full historical discussion of alchemy and chemistry.
9. **WATER ANALYSIS** **PROFESSOR FRANKFORTER**
Two credits (one lecture, four hours laboratory per week)
First semester
Open to those who have completed course 5.
The course includes an exhaustive discussion of the chemical and sanitary properties of water.
10. **GAS AND COAL ANALYSIS** **ASSISTANT PROFESSOR HARDING**
Two credits (one lecture, four hours laboratory per week)
First semester
Open to those who have completed course 5.
The work includes an exhaustive chemical examination of the common gases, with a determination of light and heat efficiency of combustible gases; also the ultimate and proximate analysis of coals and the determination of their heat values.
11. **FOOD ANALYSIS** **ASSISTANT PROFESSOR HARDING**
Three credits (one lecture, six hours laboratory per week)
First and second semesters
Open to those who have completed course 6.
The course includes the chemical analysis of the various food products and the detection of the common adulterants.
12. **SUGAR CHEMISTRY** **ASSISTANT PROFESSOR NICHOLSON**
Two credits (one lecture, four hours laboratory per week)
First semester
Open to those who have completed course 6.
The course includes the technology and chemical control of sugar manufacture.
13. **INDUSTRIAL CHEMISTRY** **MR. FRARY**
Six credits (two lectures, three hours laboratory per week)
First and second semesters
Open to those who have completed course 6.
The course includes the discussion of methods and apparatus used in chemical technology, and the testing of commercial chemical products.
14. **SPECIAL PROBLEMS** **PROFESSOR SIDENER**
Two credits (six hours laboratory per week)
First semester
Open to those who have completed course 5.
The course includes the working out of various mineralogical, technological and metallurgical problems.
15. **PHOTOGRAPHIC CHEMISTRY** **MR. FRARY**
Two credits (one lecture, three hours laboratory per week)
Second semester
Open to those who have completed course 3.
The course includes a study of the compounds affected by the chemical rays of light, and a discussion of developers and fixers, photo-engraving, photo-reliefs and color photography.

16. **ELECTROCHEMISTRY** MR. FRARY
 Two credits (one lecture, three hours laboratory per week)
Second semester
 Open to those who have completed course 5, and also course 3 in physics.
 The course includes a discussion of electro-analytical methods and industrial electrochemical processes.

17. **MICRO-CHEMICAL ANALYSIS** ASSISTANT PROFESSOR HARDING
 Two credits (one lecture, three hours laboratory per week)
Second semester
 Open to those who have completed course 5.
 The course includes the methods for the determination of minute quantities of substance by means of the microscope.

18. **IRON AND STEEL ANALYSIS** PROFESSOR SIDENER AND ASSISTANTS
 Three credits (one lecture, six hours laboratory per week)
Second semester
 Open to those who have completed course 5.
 The course includes the rapid determination of iron by the various methods as well as the determination of the associated elements, sulphur, phosphorus, silicon, manganese and carbon.

19. **MINERAL ANALYSIS** PROFESSOR SIDENER
 Two credits (six hours laboratory per week)
Second semester
 Open to those who have completed course 5.
 The course includes the analysis of building stones and some of the most important minerals.

20. **INORGANIC PREPARATIONS** ASSISTANT PROFESSOR HARDING
 Two credits (six hours laboratory)
First semester
 Open to those who have completed course 3.
 The preparation of inorganic salts, supplemented by Thorpe's Inorganic Preparations.

21. **COLLOQUIUM** MISS COHEN
 Two credits (two hours per week)
Second semester
 Open to those who have completed course 5.
 A thorough quiz in inorganic chemistry.

22. **COLLOQUIUM** PROFESSOR FRANKFORTER
 Two credits (two hours per week)
Second semester
 Open to those who have completed course 6.
 A thorough quiz in general organic chemistry

23. **SPECIAL PROBLEMS** PROFESSOR SIDENER
 Two credits (six hours laboratory per week)
First semester
 Open to those who have completed course 5.
 The course includes work on ores of base metals, limestones, slags, etc.

24. **PHYSICAL CHEMISTRY** ASSISTANT PROFESSOR DERBY
 Three credits (one lecture, six hours laboratory per week)
First semester
 Open to those who have completed course 6.
 This course includes a theoretical and applied study of physico-chemical principles and methods.

25. **TEACHERS' COURSE** MISS COHEN
 Two credits (two hours per week)
Second semester
 Open to those who have taken courses 1, 2 and 3.

The course is offered to those who are interested in the teaching of chemistry. No regular laboratory work will be offered, but certain experiments illustrating the difference between good and poor work may be given.

DRAWING AND DESCRIPTIVE GEOMETRY

WILLIAM H. KIRCHNER, M.E., *Professor of Drawing and Descriptive Geometry*

NORMAN W. ROSE, M.E., *Instructor in Drawing*

FRANK B. ROWLEY, B.S., M.E., *Instructor in Drawing*

L. W. MCKEEHAN, *Assistant in Drawing and Descriptive Geometry*

FRANK L. NEMEC, *Assistant in Drawing*

1. DRAWING MR. ROSE, MR. MCKEEHAN, MR. ROWLEY
 Three credits (six hours per week) First semester
 Required of all freshmen, in conjunction with course 3.
 The elements of general drafting. Mechanical drawing as a language. Lines, views, dimensions, standards, signs, abbreviations and explanatory notes.
 Sketching, lettering, tracing and blue printing. Representation of details of machines and structures, and the interpretation of working-drawings.
2. DRAWING MR. ROSE, MR. MCKEEHAN, MR. ROWLEY
 Two credits (four hours per week) Second semester
 Required of all freshmen. Preparation courses 1 and 3 D.
 Continuation of course 1.
3. DESCRIPTIVE GEOMETRY PROFESSOR KIRCHNER, MR. ROWLEY,
MR. ROSE AND MR. MCKEEHAN
 One credit (one hour per week) First semester
 Required of all freshmen. Open to students pursuing course 1 D.
 Projection-central and special cases; principles and applications. Representation of lines, planes, and solids, and of their relations; tangencies, intersections and developments.
 Recitations, lectures and the solution of problems.
4. DESCRIPTIVE GEOMETRY PROFESSOR KIRCHNER, MR. ROWLEY,
MR. ROSE AND MR. MCKEEHAN
 Two credits (two hours per week) Second semester
 Required of all freshmen.
 Preparation, courses 1, 3 D.
 Continuation of course 3.
5. DRAFTING PROFESSOR KIRCHNER, MR. ROWLEY, MR. ROSE
 Three credits each semester (six hours per week) First and second semesters
 Required of all sophomores. Preparation courses 1, 2, 3, 4 D.
 Graphics, machine drafting, structural drafting, and topography. Instruction in drafting-room methods.
6. ELEMENTS OF ARCHITECTURE PROFESSOR KIRCHNER
 Three credits First semester
 Required of juniors C. E. course. Preparation course, 5 D.

The orders and other fundamental forms; principles of design, the analysis of the characteristics of style, application of the elements in design.

(Not offered in 1908.)

7. TECHNICAL DRAWING

PROFESSOR KIRCHNER, MR. ROWLEY

AND MR. RO

Three credits each semester (six hours per week)

First and second semeste

Required of freshmen, analytical chemistry course.

Theoretical and practical graphics, the reading and making of working plans. Projection, sketching, lettering, conventions, renderings and translations.

FOR GRADUATES

8. DESCRIPTIVE GEOMETRY AND APPLICATIONS

9. PROJECTIVE GEOMETRY

ECONOMICS

JOHN H. GRAY, Ph.D., *Professor of Political Science*

EDWARD VAN DYKE ROBINSON, Ph.D., *Professor of Economics*

RAYMOND V. PHELAN, Ph.B., *Instructor in Economics*

1. ELEMENTS OF ECONOMICS

PROFESSOR ROBINSON, DR. PHELAN

Three credits (three recitations per week) First or second semester

Open to sophomores, juniors, and seniors.

A thorough course in the elements of economic theory, with special reference to present-day economic and social problems.

McVey's Outline and a text book, supplemented by lectures and problems, with a weekly quiz. This is a beginning course designed for those desiring a general knowledge of economics, as well as for those who mean to take advanced work in the department.

2. ECONOMIC GEOGRAPHY

PROFESSOR ROBINSON

Three credits (three recitations per week)

First semester

Open to sophomores, juniors, and seniors.

A study of the economic basis of modern civilization. The course embraces: (1), a brief survey of the history of commerce prior to the modern period; (2), an analysis of the causes, both in nature and man, which control the development and the localization of industry and commerce; (3), a summary view of the development of transportation in relation to commerce; (4), some mention of the principal materials of commerce; and, (5), a more detailed consideration of the natural resources, chief industries, commercial products and commercial relations of the leading countries. Special attention is given to the United States and to international trade routes, both by land and sea.

Text book, supplemented by lectures, reports on special topics, and quizzes.

This is a beginning course and is intended to put the student in close touch with actual economic conditions and tendencies, throughout the world.

3. MODERN INDUSTRIAL AND COMMERCIAL HISTORY

PROFESSOR GRAY

Three credits (three recitations per week) First and second semester

Open to sophomores, juniors, and seniors.

Course 3 requires no previous training in economics and may well be taken with course 1. The course continues throughout

the year, and no credit will be given unless both semesters are completed.

The industrial and commercial history of Western Europe and America since the middle of the eighteenth century. The effects of modern inventions and political changes on industry and trade.

Lectures with prescribed topical readings. One written report of considerable length will be required each semester.

4. ADVANCED ECONOMICS

PROFESSOR ROBINSON

Three credits (three recitations per week)

Second semester

Open to students who have had course 1, and required of all taking a major in economics.

An advanced course in general economics, devoted largely to a study of recent theories of distribution.

Assigned readings, reports and discussions.

5. MONEY AND BANKING

DR. PHELAN

Three credits (three recitations per week)

First semester

Open to students who have completed course 1.

The history and theory of money; nature and uses of credit; functions of banks, trust companies and other financial institutions; foreign exchange and the settlement of international balances.

Lectures, text-book, assigned readings and discussions.

6. (A) PUBLIC FINANCE

PROFESSOR ROBINSON

Three credits (three recitations per week)

First and second semesters

Open to students who have completed course 1.

The development of the state as an economic organism. Public expenditures from the view point of public wants. Budget systems of the leading countries, with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidence and administration of taxation. The theory of public debts.

Text book, supplemented by lectures and assigned readings.

6. (B) PROBLEMS OF TAXATION

PROFESSOR ROBINSON

Three credits (three recitations per week)

Second semester

Open to students who have completed course 6 (A).

Study of tax systems, tax reforms, and special forms of taxation, such as mortgage, corporation and inheritance taxes.

Based on Seligman, essays in taxation, and reports of state tax commissions with lectures and reports on special topics.

7. (A) ECONOMICS OF COMMERCE

PROFESSOR ROBINSON

Three credits (three recitations per week)

First semester

Open to students who have completed course 1, 2 or 3.

Theory of prices and price levels. Causes and characteristics of commercial crises.

Theory and mechanism of international commerce. Free trade, reciprocity and protection. The balance of trade. Economic causes of the contest for foreign markets. Organization of the export trade. Commercial treaties and foreign politics. The consular and diplomatic service as a factor in commerce.

Lectures, assigned readings, reports on special topics.

7. (B) ECONOMICS OF COLONIZATION

PROFESSOR ROBINSON

Three credits (three recitations per week)

Second semester

Open to students who have completed course 1, 2 or 3.

The economic causes of human migration. Historical survey of colonization and classification of colonies with reference to their

economic bases. Existing colonial systems, with special attention to the outlying possessions of the United States. Colonial commerce in relation to modern commercial and foreign policies. Preferential tariffs and imperial federation.

Lectures, assigned readings, reports on special topics and quiz.

8. FINANCIAL HISTORY OF THE UNITED STATES **DR. PHELAN**

Three credits (three recitations per week) **Second semester**

Open to students who have completed courses 1 and 5.

The main lines of our financial development, including our monetary and banking history, are traced by means of lectures. Readings in the literature of the subject and topics for investigation are assigned.

Lectures, assigned readings and discussions.

9. (A) ECONOMICS OF TRANSPORTATION AND COMMUNICATION

PROFESSOR ROBINSON

Three credits (three recitations per week) **Second semester**

Open to students who have completed 1 and to students in the technical colleges.

A general course on the history and theory of transportation and communication, with special reference to the United States. Early routes and methods of migration and commerce. Causes determining the location of railways. Effect of steam and electricity in the consolidation of industries and of nations.

Signal systems, the post, telegraph and telephone. Parcels post and express service. Economic functions and relations of highways, interurban electric lines, steam railways, inland waterways and ocean transportation. The organization of ocean commerce.

Lectures, assigned readings and discussions.

9. (B) RAILWAY ECONOMICS

PROFESSOR ROBINSON

Three credits (three recitations per week) **First or second semester**

Open to graduates, students in the technical colleges, and upper classmen who have completed courses 1 and 9 (A).

An advanced course devoted to the study of railway problems and administration including: (1) conditions affecting economy of operation; (2) passenger and goods traffic; (3) economic principles underlying the making of railway rates; (4) competition in relation to rate wars, discrimination between persons, places and commodities, pooling, various forms of combination; (5), the great railway systems of the United States; (6), regulation by the states and the federal government; (7), government ownership and operation of railways in Europe and Australasia.

Lectures, assigned readings and discussions.

10. MUNICIPAL INDUSTRIES

PROFESSOR GRAY

Three credits (three recitations per week) **Second semester**

Open to students who have completed course 1. If possible, course 11 should also be taken before course 10.

The causes and the social and economic effects of the recent rapid development of municipal industries. A comparison of the results of public and of private ownership of such industries. The general question of municipal ownership.

Text books, lectures and quizzes.

11. THE MODERN BUSINESS CORPORATION

PROFESSOR GRAY

Three credits (three recitations per week)

Second semester

Open to students who have completed course 1.

The organizing, financing and managing of corporations; the position of the corporation before the law; methods of account-

ing; the relation of the government to the corporation; the question of trusts in its various phases.

Text books; Ripley, Trusts, Pools and Corporations; Meade's Trust Finance; Wyman's Case.

Lectures, class discussions and reports.

12. **THEORY AND PRACTICE OF STATISTICS** **PROFESSOR ROBINSON**
 Two credits (two recitations per week) **First semester**
 Open to students who have six credits in economics.
 An introduction to the theory and method of statistics. Aspects of economic and social life which are capable of statistical measurement. Use and limitations of index numbers.
 Based on Bowley and Mayo-Smith, with lectures and practical exercises.
13. **HISTORY OF ECONOMIC THOUGHT** **PROFESSOR ROBINSON**
 Two credits (two recitations per week) **First semester**
 Open to students who have six credits in economics.
 A survey of economic thought, especially since Adam Smith. Emphasis is placed on the recent period.
 Lectures, assigned readings, reports on special topics.
14. **ECONOMICS OF AGRICULTURE**
 Three credits (three recitations per week) **Second semester**
 Open to students who have completed course 1 or 2 and to others by special permission of the instructor.
 Historic development of agriculture and comparison of existing systems with reference to stage of economic development and geographic conditions. Transition in the United States from extensive to intensive and from general to specialized farming, in relation to the law of decreasing returns. Markets, transportation facilities and other causes affecting the value of land and the prices of farm products. The size, organization, labor-system and ownership of farms as bearing on economic efficiency and social and political conditions.
 Lectures, assigned readings, reports on special topics and quizzes.
15. **ECONOMICS OF INSURANCE**
 Three credits (three recitations per week) **First semester**
 Open to students who have completed course 1 and to others by special permission.
 Kinds and economic functions of insurance. Life, fire, marine, accident, fidelity. History and theory of life insurance, forms of standard policies, public supervision. The aim is to treat those aspects of insurance which are of importance to practical men of affairs.
16. **LABOR PROBLEMS** **DR. PHELAN**
 Three credits (three recitations per week) **First semester**
 Open to students who have completed course 1.
 Labor unions, strikes, systems of wage payment, arbitration, poverty, child labor, etc. Efforts, public and private, to secure justice and social well-being.
 Lectures, text book, assigned readings, and discussions.
17. **RACES AND IMMIGRANTS IN AMERICA** **DR. PHELAN**
 Three credits (three recitations per week) **Second semester**
 Open to students who have completed course 1.
 The economic and social contributions of the different races to American progress and civilization. The economic and social conditions in foreign countries that lead to emigration.

The general problem of immigration. The special problem of the Slav, the Italian, the Negro, the Chinese and the Japanese. Lectures, text book, topics, discussions.

18. **CHARITIES AND CORRECTIONS, WITH SPECIAL REFERENCE TO ECONOMIC CONDITIONS IN AMERICAN CITIES** MR. LI
Three credits (three recitations per week) First or second semester
Open to students who have completed courses 1 or 3 in economics or course 1 in sociology.
A study of the causes of economic dependence in American cities, the standard of living, and the constructive agencies for economic betterment.
Given by lectures with assigned readings and visits of inspection in the Twin Cities.
19. **THE PRINCIPLES OF ACCOUNTING**
Three credits (three recitations per week) First and second semester
Open to students who have completed course 1.
The theory and practice of accounting, with a view to general business efficiency. Methods employed in manufacturing, mercantile, banking and railway accounting. Analysis of industrial, bank and railway reports.
Lectures and exercises.
20. **ELEMENTS OF BUSINESS LAW**
Three credits (three recitations per week) First or second semester
Open to students who have completed course 1.
The principles of law governing ordinary commercial transactions. The aim is to teach so much of the law as every educated man ought to know for his guidance in every-day business affairs.
Assigned readings, lectures and quizzes.
21. **SEMINAR IN ECONOMICS** PROFESSOR GRAY, PROFESSOR ROBINSON
MR. GEROULD AND DR. PHELAN
Three to six credits (three recitations per week) First and second semester
Open to graduates and to others who have not less than twelve credits in economics, and are capable of making original investigations.
A course in research and in methods of investigation.
This course will be conducted jointly by all the instructors, each striving to be of special service to students who choose topics within the field of his special interests: Professor Gray in connection with local public service corporations; Professor Robinson in connection with taxation, transportation and industries of importance in this section, such as wheat and iron; Dr. Phelan in connection with currency questions, labor socio-economic theories, and also taxation.
Definite topics can be assigned only after conference. This is a unit course and credit will be given only on completion of both semesters.
22. **BUSINESS ORGANIZATION**
Three credits (three recitations per week) Second semester
Open to students who have completed course 1.
A study of the internal organization and management of large-scale industry, covering typical manufacturing and mercantile concerns.
Based on Aparling, Introduction to Business Organization, with lectures, assigned readings and discussions.

23. ECONOMICS OF FORESTRY

Three credits (three recitations per week)

First semester

Open to students who have completed course 1 or 2.

The economic importance of forests, their relation to other industries and connection with the problems of erosion, irrigation, drainage and inland navigation. Forest reserves and other forest resources of the United States. Need and economic aspects of scientific forestry.

Lectures, assigned readings and reports.

24. SCOPE AND METHODS OF ECONOMICS**PROFESSOR ROBINSON**

Two credits (two recitations per week)

Second semester

Open to students who have six credits in economics.

Consideration of the successive views which have prevailed as to the scope and logical methods of economics. Relation of economics to the other social sciences, and to ethics.

Lectures, assigned readings and discussions.

25. ECONOMICS OF INVESTMENT AND SPECULATION

Three credits (three recitations per week)

Second semester

Open to students who have taken course 1.

The causes affecting the values of securities. Classes of investments and methods of calculating income. Bearings of investment on the formation of social classes.

The economic functions of speculation, organization and working of stock and produce exchanges. Their relation to industry and to the money market. The work of Wall street.

Lectures, assigned readings, and exercises in the interpretation of current quotations for securities.

26. (A) SOCIAL THEORIES**DR. PHELAN**

Three credits (three recitations per week)

First semester

Open to students who have completed course 1.

A survey of social Utopias from Plato to Henry George, with special attention to modern scientific socialism as a philosophy of industrial evolution and as a program of economic reform.

Lectures, assigned readings, reports and discussions.

26. (B) THE STATE IN RELATION TO INDUSTRY

Three credits (three recitations per week)

Second semester

Open to students who have completed course 1; but should, if possible, follow course 26 (A).

A study of the influence exercised by society and by the state on the production and distribution of wealth. The force of custom; effect of private property and other social institutions; and results of economic legislation designed to limit the freedom, or raise the plane of competition. General survey of the relation of the state to industry.

Lectures, assigned readings and reports.

ELECTRICAL ENGINEERING**WILLIAM T. RYAN, E.E.,** *Instructor in Electrical Engineering***5. ELECTRICAL POWER****MR. RYAN**

Three credits (four hours per week)

First and second semesters

Required of seniors. M. E. and Chemical courses. Preparation, courses 5-6 Physics

Lectures, recitations and laboratory work, supplemented by numerous practical problems. Textbook: Franklin and Esty, *Elements of Electrical Engineering Practice*.

COURSES IN GEOLOGY AND MINERALOGY

CHRISTOPHER W. HALL, M.A., *Professor of Geology and Mineralogy*

FRANK F. GROUT, B.S., *Instructor in Geology and Mineralogy*

GEOLOGY

1. GENERAL GEOLOGY

PROFESSOR HALL

Three credits (three hours laboratory, three lectures per week)

First semester

Open to juniors and seniors.

Comprises: (1) Geodynamics, in which are set forth phenomena of the atmosphere, water, heat, gravity, and plants and animals as geologic agents; (2) structural geology, wherein stratification, displacement and veining of rock masses are described; (3) physiographic geology, pointing out prominent earth features and inquiring into the causes producing them; (4) an outline of historical geology. Lectures and conferences illustrated by photographs, maps, profiles, and lantern slides.

10. ELEMENTS OF ROCK STUDY

MR. GROUT

Three credits (three hours laboratory, three lectures per week)

Second semester

Open to juniors and seniors.

Requisite, course 1 or equivalent.

The structures, textures, and mineral and chemical composition of rocks. A practical study of rock types with laboratory and field practice. The origin, occurrence, variation and alteration of rocks are considered with a view to their accurate description. An introduction to the use of the microscope concludes the course.

Kemp's Handbook of Rocks, reference reading and practice.

11. PETROGRAPHY

MR. GROUT

Three credits (three hours laboratory, three lectures per week)

Second semester

Requisite, course 9.

Open to juniors or seniors.

The identification of rocks through the optical study of the component minerals; rock structure as seen under the microscope; alterations of rocks, and stratigraphic relations are studied. Preparation of material for study, its collection in the field and an examination of some group of Minnesota crystalline rocks are features of the course.

Laboratory, lectures, reference reading and field work.

12. APPLIED GEOLOGY

MR. GROUT

Three credits (three hours laboratory, three lectures per week)

First semester

Open to juniors and seniors.

An outline of the economic relations of geology. The course comprises a discussion of the nature and distribution of non-metallic materials of economic value, including coal, mineral oil and natural gas; phosphates and other natural fertilizers; soils; the geologic conditions of water supply; abrasive and fictile materials; natural and artificial building stones; mortars and cements; road-making materials; followed by a brief

summary of the nature and distribution of ore deposits. Text-book and reference reading.

MINERALOGY

1. **ELEMENTS OF MINERALOGY** PROFESSOR HALL AND MR. GROUT
Three credits (three hours laboratory, three lectures per week)
First semester
Open to all students.
 - (a) The morphology of minerals; the physical and chemical characters of minerals, with demonstrations; a study of the native elements and economic minerals; the basis of classifications.
 - (b) Laboratory work; this consists of practice in the recognition of crystal forms, tests illustrating the range of minerals, and the application of chemical and blowpipe analysis to the identification of species.
2. **DESCRIPTIVE MINERALOGY** PROFESSOR HALL AND MR. GROUT
Three credits (three hours laboratory, three lectures per week)
Second semester
Open to all the students.
 - (a) A study of the rock-forming minerals; the projection and construction of figures of crystals; the calculation of crystal-axes. Thesis.
 - (b) Laboratory work; includes quantitative blowpipe analysis, crystal measurement, the sight determination of minerals, and reference reading.
4. **OPTICAL MINERALOGY** MR. GROUT
Three credits (three hours laboratory, three lectures per week)
Second semester
Open to juniors or seniors.
A study of the microscopic structure of crystals and crystal grains.
An application of methods used in determining minerals by their optical properties; goniometric and stauroscopic practice, embracing the elements of lithology. Lectures and laboratory work.
5. **THE MORPHOLOGY OF MINERALS** MR. GROUT
Three credits (three hours laboratory, three lectures per week)
First semester
Open to juniors or seniors.
A study of crystallography, embracing projection and the geometric relations of crystal planes. The identification of minerals from crystal measurement and mathematical calculation. Crystal nomenclature.
6. **PHYSICO-CHEMICAL METHODS WITH THEIR APPLICATIONS** MR. GROUT
Three credits (three hours laboratory, three lectures per week)
Second semester
Open to seniors.
The methods of micro-chemical analysis described and demonstrated; the leading elements found in minerals are determined through the aid of crystalline precipitates of known compounds. Special attention is given to the study and determination of the rock-making minerals.

GERMAN LANGUAGE AND LITERATURE

JOHN G. MOORE, B.A., *Professor of German*

CARL SCHLENKER, B.A., *Professor of German*

HANS JUERGENSEN, *Assistant Professor of German*

MATILDA WILKIN, M.L., *Assistant Professor of German*

OSCAR BURKHARD, M.A., *Instructor in German*

CHARLES WILLIAMS, M.A., *Instructor in German*

1. BEGINNING PROFESSOR SCHLENKER, ASSISTANT PROFESSORS
WILKIN AND JUERGENSEN, MR. BURKHARD AND MR. WILLIAMS
Ten credits (five hours per week) First and second semesters
Open to all who do not present German for entrance.
Pronunciation, grammar, conversation and composition; selected
reading in easy prose and verse.
To follow this course students may take course 2 or course 3,
and course 5 as a supplementary course to either.
3. SCIENTIFIC INTERMEDIATE ASSISTANT PROFESSOR JUERGENSEN
Six credits (three hours per week) First and second semesters
Open to students who have completed course 1.
First semester—Hodge's German Science Reader (or equivalent).
Second semester—Brandt and Day's German Scientific Reading.
This course aims to give the student a reading knowledge of
German for use in scientific studies.
This course may be supplemented by course 5. To follow this
course students may elect course 7 or course 6, but must not
elect course 4.
4. CLASSIC PROSE AND POETRY PROFESSOR MOORE, ASSISTANT PROFESSOR
WILKIN, MR. BURKHARD AND MR. WILLIAMS
Six credits (three hours per week) First and second semesters
Open to students who have presented German for entrance.
Not open to students who have credit for course 2 or course 3.
First semester—Meissner's Aus deutschen Landen; Goethe's
Gedichte. Second semester—Schrakamp's Berühmte Deutsche.
Heine's Buch der Lieder. Review of German grammar through-
out the year. This course may be supplemented by course 5.
7. ADVANCED SCIENTIFIC READING ASSISTANT PROFESSOR JUERGENSEN
Six credits (three hours per week) First and second semesters
Open to students who have taken course 3 or course 4.
Reading of monographs and periodicals.

GYMNASIUM

LOUIS J. COOKE, M.D.

JENNINGS C. LITZENBERG, M.D.

A well-equipped gymnasium in charge of a professional medical director is open for the young men. The training and exercise is under the immediate oversight and authority of the medical director and is wholly with a view to the healthful physical development of the whole student body.

All young men are required to be examined by the medical director of physical culture upon registration and during the course as often as the indications of the physical condition may require.

The decision of the director will be either.

1. Advisory, indicating what course of hygiene and exercise will best sustain and improve the health of the student, or

2. Mandatory, requiring the students to pursue the course of hygiene and physical exercise necessary for the proper care of health and the discharge of their duties as students.

Gymnasium work is required of all men in the freshman class, one hour per week (in two half-hour periods if the director so decides) throughout the year. The required work includes a course of lectures on personal hygiene, during the first term.

MACHINE DESIGN

JOHN V. MARTENIS, M.E., *Instructor in Machine Design*

12. KINEMATICS AND ELEMENTARY MACHINE DESIGN

MR. MARTENIS

Three credits (six hours per week)

Second semester

Required of juniors, M. E. and E. E. course. Preparation, course 4M.

Graphical diagrams of the paths, speeds and accelerations of important mechanisms; centroids, analysis of mechanisms, construction of cams; roulettes, tooth profiles; kinematic pairs; machine parts.

MATHEMATICS

GEORGE N. BAUER, Ph.D., *Professor of Mathematics*

JOHN F. DOWNEY, M.A., C.E., *Professor of Mathematics*

WILLIAM H. BUSSEY, Ph.D., *Assistant Professor of Mathematics*

HANS DALAKER, B.S., *Instructor in Mathematics*

JAMES E. MANCHESTER, Sc.D., *Instructor in Mathematics*

ROYAL R. SHUMWAY, B.A., *Instructor in Mathematics*

4. TRIGONOMETRY

PROFESSOR BAUER, ASSISTANT PROFESSOR BUSSEY, DR. MANCHESTER, MR. SHUMWAY, AND MR. DALAKER

Three credits (three hours per week)

First semester

Open to those having credits in courses 1, 2, and 3. Text, tables, and numerous applications.

5. ANALYTICAL GEOMETRY

PROFESSOR DOWNEY, DR. MANCHESTER

Three credits (three hours per week)

First semester

Open to those who have completed courses 1, 2, 3 and 4.

The conic sections, both by rectilinear and polar co-ordinates, producing equations of loci whose law of development is known, constructing and discussing such equations, transformation of co-ordinates, properties of loci by means of their equations.

6. DIFFERENTIAL CALCULUS

PROFESSOR DOWNEY, DR. MANCHESTER

Three credits (three hours per week)

Second semester

Open to those who have completed courses 1 to 5, inclusive.

Differentiation of algebraic and transcendental functions, development of functions, indeterminate forms, maxima and minima, treatment of tangents, subtangents, normals, subnormals, asymptotes, direction and rate of curvature, evolutes, envelopes and singular points.

The School of Chemistry

MECHANICAL ENGINEERING

JOHN J. FLATHER, Ph.B., M.M.E., *Professor of Mechanical Engineering*

JOHN V. MARTENIS, M.E., *Instructor in Machine Design*

PETER PETERSON, *Instructor in Foundry Practice*

EDWARD QUIGLEY, *Instructor in Forge Work*

WILLIAM H. RICHARDS, *Instructor in Carpentry and Pattern Work*

S. CARL SHIPLEY, B.S., *Instructor in Machine Work*

C. F. SHOOP, B.S., *Instructor in Mechanical Engineering*

SHOP WORK

1. CARPENTRY AND PATTERN MAKING MR. RICHARDS

Four credits (six hours per week, twenty-four weeks)

First and second semesters

Required of all freshmen.

Wood working, use of tools; lathe and bench work. Patterns for moulding, core boxes, flasks. Lectures and practice.

2. BLACKSMITHING MR. SHIPLEY AND MR. QUIGLEY

Two credits (six hours per week, twelve weeks)

First or second semester

Required of all freshmen.

Use of tools, forging, welding, tool dressing, tempering. Lectures and practice.

MECHANICAL LABORATORY

WILLIAM H. KAVANAUGH, M.E., *Professor of Experimental Engineering*

C. F. SHOOP, B.S., *Instructor in Mechanical Engineering*

1. MATERIALS TESTING LABORATORY PROFESSOR KAVANAUGH, MR. SHIPLEY

Two credits (lecture and laboratory)

First semester

Required of juniors.

Investigation of the strength and physical qualities of iron, steel, brass, copper, wood, belting, ropes, chains and cement. Supplemented by lectures on the various materials of construction and standard methods of testing.

MECHANICS

WILLIAM E. BROOKE, B.C.E., M.A., *Professor of Mathematics*

HENRY T. EDDY, C.E., Ph.D., LL.D., *Professor of Mathematics and Mechanics*

BURT L. NEWKIRK, Ph.D., *Assistant Professor of Mathematics and Mechanics*

- 7a'. APPLIED MECHANICS PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK

Five credits (five hours per week)

First semester

Required of all juniors in the mechanical and electrical engineering courses. Prerequisites the same as course 7'. The principles of statics and dynamics, and the mechanics of the materials of construction.

8'. HYDRAULICS AND PUMPING MACHINERY **PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK**

Five credits (five hours per week) **Second semester**

Required of all juniors. Prerequisite course 7 or 7a'. Laws of the equilibrium, pressure and flow of liquids; theory of the action of pumps, compression and flow of gases.

METALLURGY

WILLIAM R. APPLEBY, M.A., *Professor of Metallurgy*

PETER CHRISTIANSON, B.S., E.M., *Assistant Professor of Assaying*

LEVI B. PEASE, B.Sc.Chem., M.S., *Assistant Professor of Metallurgy*

1. ASSAYING **PROFESSOR APPLEBY AND ASSISTANTS**

Eight credits (four lectures and eight laboratory hours per week)

Second semester

Open to students completing mineralogy 1. Required of freshmen. Determination of values of ores, metallurgical products and bullion.

3. GENERAL METALLURGY AND METALLURGY OF IRON

ASSISTANT PROFESSOR CHRISTIANSON

Three credits (three lectures per week)

First semester

Open to students completing 1. Required of juniors.

Combustion, fuels, refractory material and furnaces. Lectures and recitations on metallurgy of iron.

4. METALLURGY OF WROUGHT IRON AND STEEL

ASSISTANT PROFESSOR

CHRISTIANSON

Three credits (three lectures per week)

Second semester

Open to students completing 3. Required of juniors.

Consideration of the principles of manufacture, details of plant construction and chemical and physical phenomena.

5. METALLURGY OF THE BASE METALS

ASSISTANT PROFESSOR PEASE

Four credits (four lectures per week)

Second semester

Open to students completing 4. Required of juniors.

Lead, copper, zinc and mercury. Consideration of smelting methods and principles involved in refining methods.

6. METALLURGY OF THE PRECIOUS METALS

ASSISTANT PROFESSOR PEASE

Four credits (four lectures per week)

Second semester

Open to students completing 5. Required of seniors.

Gold, silver and platinum. Methods and principles of cyanidation, chlorination, amalgamation, and lixiviation as applied to the treatment of above.

MILITARY SCIENCE AND TACTICS

EDWARD SIGERFOOS, Ph. B., Captain U. S. A., Commandant

For the instruction in military drill and administration the students are organized into a corps of cadets, consisting of four battallions of infantry, a band and a platoon of artillery.

A uniform of prescribed pattern is worn by all cadets during drill.

The uniform consists of blouse, trousers and cap, modelled after the U. S. Military Academy cadet uniform, and costs in Minneapolis about \$15, and is as neat and economical dress as the student can obtain.

Drill is required of all men in the freshman and sophomore classes.

Military drill may be taken voluntarily by others outside of the freshman

and sophomore classes; and to encourage this, as it is considered beneficial, not only to the individual student, but to the State generally, the extra work is encouraged by allowing a year's drill to count as a two-hour credit for one semester, but no credit will be allowed for such drill for less than one year.

In addition to the above, a course is given in Military Science, optional with the seniors and juniors, during the second semester, two hours a week. This work, when satisfactorily completed, taken in connection with the year's drill, will give a four-hour credit for the semester.

Military instruction is intended to be so conducted as to develop a soldier-like bearing and foster a spirit of gentlemanly courtesy, soldierly honor and obedience to lawful authority, as well as to familiarize students with company and battalion manœuvres, guards and the theoretical and practical use of firearms.

On graduation of each class the commandant will report to the adjutant general of the army the names of the graduates who have shown special aptitude for the military service and furnish a copy thereof to the adjutant general of the state.

The officers and non-commissioned officers are required to be good students in the other departments, soldier-like in the performance of their duties, exemplary in their general deportment and able to pass a creditable examination in drill regulations. In general, the officers are selected from the senior class; the sergeants from the junior class; and the corporals from the sophomore class.

Freshman—Practical instruction in schools of the soldier, company and battalion; signals, ceremonies; schools of the cannoneer and battery.

Sophomore—Practical and theoretical instruction in schools of the company and battalion; advance and rear guard drill; practical and theoretical instruction in guard duty. Gallery practice. Ceremonies.

Junior and senior—Theoretical instruction—Advance and rear guards, outposts, reconnaissance, camping, duties of company commander, articles of war, records.

PHYSICS

HENRY A. ERICKSON, E.E., *Assistant Professor of Physics*

FREDERICK S. JONES, M.A., *Professor of Physics*

ANTHONY ZELENY, M.S., *Assistant Professor of Physics*

JOHN ZELENY, B.A., Ph.D., *Professor of Physics*

ALOIS F. KOVARIK, B.A., *Instructor in Physics*

1. GENERAL PHYSICS

PROFESSOR JOHN ZELENY

Three credits (three recitations per week)

First semester

Open to sophomores, juniors and seniors.

Mechanics of solids and fluids, heat and sound. This is the first part of a general course in physics. The treatment is experimental rather than mathematical. The course is designed to give the student a general knowledge of the fundamental principles of the subject and will be found especially useful to those pursuing other sciences.

2. GENERAL LABORATORY PRACTICE

MR. KOVARIK

One credit (two hours laboratory work per week)

First semester

Open to sophomores, juniors and seniors.

Physical measurement in the mechanics of solids and fluids, and in heat and sound, giving the student a knowledge of experimental methods. This course is intended to accompany course 1.

3. **GENERAL PHYSICS** PROFESSOR JOHN ZELENY
 Three credits (three recitations per week) Second semester
 Open to sophomores, juniors and seniors.
 Light, electricity and magnetism. This is the second part of a general course in physics. The treatment is experimental and the fundamental principles of the subjects, including those of radioactivity, ionization, and radiation and the electrical constitution of matter are discussed and illustrated.
4. **GENERAL LABORATORY PRACTICE** MR. KOVARIK
 One credit (two hours laboratory work per week) Second semester
 Open to sophomores, juniors and seniors.
 Physical measurements in light, electricity and magnetism, giving the student a knowledge of experimental methods. This course is intended to accompany course 3.
5. **GENERAL PHYSICS (Advanced Course)** PROFESSOR JONES,
ASSISTANT PROFESSORS A. ZELENY AND ERIKSON
 Six credits (eight hours per week) First semester
 Open to sophomores, juniors and seniors.
 Mechanics of solids and fluids, the properties of matter, heat and sound. This course is intended to give a thorough training in general physics including the solution of numerous problems. It is adapted to those students who expect to specialize in physics, to teach the science or to enter upon a technical course.
6. **GENERAL PHYSICS (Advanced Course)** PROFESSOR JONES,
ASSISTANT PROFESSORS A. ZELENY AND ERIKSON
 Six credits (eight hours per week) Second semester
 Open to sophomores, juniors and seniors.
 Light, electricity and magnetism. This course completes the work in general physics and is intended for those students who wish to specialize in the science, to teach the subject, or to enter upon a technical course.
7. **ELECTRICAL MEASUREMENTS** ASSISTANT PROFESSOR A. ZELENY
 Three credits (four hours laboratory, two lectures per week) First semester
 Open to juniors and seniors.
 The course aims to give a thorough, practical knowledge of electrical instruments and of the fundamental electrical measurements. The system of electrical units is developed theoretically and experimentally.
8. **PHYSICAL MANIPULATION AND LABORATORY TECHNIQUE** PROFESSOR JOHN ZELENY
 Three credits (three recitations per week) Second semester
 Open to juniors and seniors.
 The object of this course is to give the student a knowledge of the essential physical manipulations, such as the cleaning and distilling of mercury, soldering, glass blowing, glass cutting, glass grinding, making of quartz fibers, etc.; and to acquaint him with the use of some instruments of precision, such as the cathetometer, comparator, the dividing engine, the balance, mercury air pumps and gauges, etc. The course is especially valuable to those who intend to teach the science or to specialize in it.
9. **DYNAMICS** PROFESSOR JONES
 Three credits (three recitations per week) First semester
 Open to juniors and seniors.

A discussion of some problems in dynamics which are important in the study of advanced physics.

10. **ADVANCED PHYSICAL MEASUREMENTS** **PROFESSOR JOHN ZELENY**
 Three credits (four hours laboratory, two lectures per week)
First semester
 Open to seniors and graduates.
 The course consists of individual work in the laboratory on topics especially chosen to serve best the needs and capacity of each student. The course is intended to introduce the student to some of the more intricate physical measurements and to teach him self-reliance.

11. **ADVANCED PHYSICAL MEASUREMENTS** **PROFESSOR JOHN ZELENY**
 Six credits First semester
 Open to seniors and graduates.
 The same as course 10, except that twice as much time is devoted to the subject.

12. **THE THEORY OF LIGHT** **PROFESSOR JONES**
 Three credits (three recitations per week) Second semester
 Open to graduates. Hours to be arranged.
 A study of the important optical phenomena. Preston's Theory of Light is used as a text.

13. **ELECTRICAL MEASUREMENTS OF PRECISION** **PROFESSOR A. ZELENY**
 Three credits (three recitations per week) Second semester
 Open to seniors. Hours to be arranged.
 The course is chiefly experimental and includes the following: making of standard cells; calibration of wheatstone box bridge; adjustment of resistances, ammeters and voltmeters; use of the potentiometer in measurements of highest precision; experimental problems involving capacity, inductance and magnetic flux; measurement of temperatures by electrical methods.

14. **RADIOACTIVITY** **MR. KOVARIK**
 Three credits (three recitations per week) Second semester
 Open to graduates.
 The course consists entirely of lectures, experimental and descriptive. The various theories and the methods of investigation are fully considered.

15. **ADVANCED PHYSICAL MEASUREMENTS** **PROFESSOR JOHN ZELENY**
 Three credits (three recitations per week) Second semester
 Open to seniors and graduates.
 This course consists of the experimental study of some physical phenomena, the nature or laws of which are not yet understood.

16. **ADVANCED PHYSICAL MEASUREMENTS** **PROFESSOR JOHN ZELENY**
 Six credits Second semester
 Open to seniors and graduates.
 The same as course 15, except twice as much time is devoted to the subject.

17. **THE KINETIC THEORY OF GASES** **ASSISTANT PROFESSOR ERIKSON**
 Three credits (three recitations per week) Second semester
 Open to graduates. Hours to be arranged.
 This course is a study of Meyer's Kinetic Theory of Gases.

18. **DISCHARGE OF ELECTRICITY THROUGH GASES** **PROFESSOR JOHN ZELENY**
 Three credits (three recitations per week) First semester

Open to graduates. Hours to be arranged.

The course consists of lectures, with experimental illustrations, on the conduction of electricity through gases. A study is made of the conductivity imparted to gases by the action of X-rays, ultra-violet light, radioactive substances, and glowing metals; of the discharge of electricity from points and in vacuum tubes; and of the spark arc discharges. The methods of measuring the velocity of the ions and the charges carried by them are studies in detail.

19. THE MATHEMATICAL THEORY OF ELECTRICITY AND MAGNETISM

PROFESSOR JOHN ZELENY

Three credits (three recitations per week)

Second semester

Open to graduates. Hours to be arranged.

This course consists in the study of J. J. Thompson's *Elements of the Mathematical Theory of Electricity and Magnetism*.

RHETORIC

OSCAR W. FIRKINS, M.A., *Instructor in Rhetoric*

LINDA H. MALEY, B.L., *Instructor in Rhetoric*

CHARLES W. NICHOLS, M.A., *Instructor in Rhetoric*

NELLIE A. WHITNEY, *Instructor in Rhetoric*

HELEN GRIFFITH, B. A., *Assistant in Rhetoric*

1 (a). RHETORIC

MR. FIRKINS, MR. NICHOLS, MISS MALEY,

MISS GRIFFITH AND MISS WHITNEY

Six credits (three hours per week)

First and second semesters

Open to all freshmen who have passed the entrance test in English.

This course includes the study of formal rhetoric, the writing of compositions, and the study and analysis of masterpieces of prose.

2 (a). RHETORIC

MR. FIRKINS AND MISS MALEY

Six credits (three hours per week)

First and second semesters

Open to students who have completed course 1, and to sophomores of whom, at entrance, rhetoric was not required.

The course consists of a study of the short story in the first semester, and of the essay and forms of public address in the second semester. The writing of compositions and the keeping of a note book form a greater part of the work.

SOCIOLOGY

ALBERT ERNEST JENKS, Ph.D., *Professor of Anthropology*

SAMUEL G. SMITH, Ph.D., LL.D., *Professor of Sociology*

1. DESCRIPTIVE SOCIOLOGY

PROFESSOR JENKS

Three credits (three hours per week)

First semester

Open to juniors and seniors.

This is a preliminary course designed as the first work of students in the sociology department. It presents concrete data concerning human association, showing groups of peoples living in the four grades of culture called savagery, barbarism, civilization, and enlightenment; and it discovers the activities and

institutions natural and peculiar to these cultures. Text book, lectures, assigned readings, and thesis.

2. **ELEMENTS OF SOCIOLOGY** PROFESSOR JENKS
Three credits (three hours per week) Second semester
Open to juniors and seniors.
This course is designed to give a general knowledge of the field of modern sociology, the attempt being to prepare students for such special sociological investigations as they may wish to make. Text book, lectures, assigned readings and thesis.
3. **SOCIAL PATHOLOGY** PROFESSOR SMITH
Three credits (three hours per week) First semester
Open to juniors and seniors.
Dealing with problems of poverty, crime, insanity, social degeneration, and a discussion of the child problem and methods of social amelioration.
4. **SOCIAL THEORY** PROFESSOR SMITH
Three credits (three hours per week) First semester
Open to juniors and seniors who have had courses 1 or 2.
This course includes a study of the leading American, English, French, and German writers to discover their methods of approach to the science and the leading results they have secured.
5. **SOCIAL GROUPS** PROFESSOR SMITH
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed course 1.
An examination of the clan and the village in primitive life, a study of demography to discover the effect of environment upon social organization, and a comparison with the nature of and reason for the modern city.

GE of EDUCATION

The College of Education

FACULTY

CYRUS NORTHROP, LL. D., *President*

GEORGE F. JAMES, Ph. D., *Dean and Professor of Education*

A. W. RANKIN, B. A., *Professor of Education*

FLETCHER HARPER SWIFT, Ph. D., *Assistant Professor of Education*

JOHN F. DOWNEY, M. A., C. E., *Professor of Mathematics*

JOHN G. MOORE, B. A., *Professor of German*

CHRISTOPHER W. HALL, M. A., *Professor of Geology and Mineralogy*

JOHN C. HUTCHINSON, B. A., *Professor of Greek*

MARIA L. SANFORD, *Professor of Rhetoric and Elocution*

CHARLES W. BENTON, M. A., Litt. D., *Professor of French*

HENRY F. NACHTRIEB, B. S., *Professor of Animal Biology*

FREDERICK S. JONES, M. A., *Professor of Physics*

WILLIS M. WEST, M. A., *Professor of History*

J. J. FLATHER, Ph. B., M. M. E., *Professor of Mechanical Engineering*

GEORGE B. FRANKFORTER, Ph. D., *Professor of Chemistry*

FRANCIS P. LEAVENWORTH, M. A., *Professor of Astronomy*

JOSEPH BROWN PIKE, M. A., *Professor of Latin*

SAMUEL G. SMITH, Ph. D., LL. D., *Professor of Sociology*

NORMAN WILDE, Ph. D., *Professor of Political Science*

JOHN HENRY GRAY, Ph. D., *Professor of Political Science*

WILLIAM A. SCHAPER, Ph. D., *Professor of Political Science*

FREDERIC E. CLEMENTS, Ph. D., *Professor of Botany*

EDWARD VAN DYKE ROBINSON, Ph. D., *Professor of Economics*

FRANCES S. POTTER, M. A., *Professor of English*

LOUIS J. COOKE, M. D., *Director of Gymnasium*

EDWARD M. LEHNERTS, M. S., *Assistant Professor of Geography*

JAMES BURT MINER, Ph. D., *Assistant Professor of Psychology*

CARLYLE M. SCOTT, *Assistant Professor of Music*

JOHN B. JOHNSTON, Ph. D., *Associate Professor of Neurology*

D. D. MAYNE, *Principal of the School of Agriculture*

INSTRUCTORS

MARGARET BLAIR, *Domestic Art*

ANNA M. BUTLER, *Physical Culture*

HENRIETTA CLOPATH, *Drawing*

CHARLES M. HOLT, *Education*

S. C. SHIPLEY, B. S., M. E., *Machine Work*

JUNIATA SHEPPERD, *Domestic Science*

W. H. RICHARDS, *Sloyd and Woodwork*

THE COLLEGE OF EDUCATION

The College of Education was authorized by a special enactment of the Legislature of Minnesota in 1905, and was established by the Regents of the University in the following year.

It offers both a practical and a theoretical training for prospective high school teachers and principals, for principals of elementary schools, for supervisors of special studies, and for superintendents of school systems.

ADMISSION

Entrance examinations are held only at the beginning of the college year. Students prevented from entering at that time may be admitted later if the circumstances justify this action. Such students are however at a great disadvantage and all students expecting to enter the college are urged to be present at the beginning of the year.

All applicants should present themselves to the Registrar, who will furnish them with application blanks and directions how to proceed with their examinations and registration.

CONDITIONS OF ADMISSION

Students who plan to enter the College of Education are advised to consult with the Dean in regard to their course of study during their first year of college study. When they have completed with credit at least two full years of college work, they will be admitted to this college. During these two years they should have pursued one or more of the subjects which they expect to teach and, in addition, at least one course in general psychology.

ADMISSION TO ADVANCED STANDING

I. *From other colleges*

This college accepts records from all colleges of equal rank for credit to advanced standing. All candidates for graduation must however meet the conditions established by this college as indicated in a succeeding paragraph.

II. *From Minnesota Normal Schools*

Graduates of the "advanced graduate course" of a Minnesota State Normal School who have completed in addition a full year of college work will be admitted to the College of Education, but will not be permitted to elect either course 5 or course 7 in education. Individual

graduates of either of the five-year courses of a Minnesota State Normal School will be admitted under the same regulations.

UNCLASSED STUDENTS

Applicants who present satisfactory reasons for not taking the regular course may be admitted as unclassified students upon proof of fitness to profit by the work. The same general attainments are expected of these students as are required of those who enter the regular course. Unclassified students must take the same number of hours as regular students, except that men and women actually engaged in teaching may be allowed to enter for a less amount of work upon the approval of the committee in charge.

EXAMINATIONS

At the close of each semester examinations are held and students are reported as "excellent," "good," "passed," "incomplete," "conditioned," or "failed". An "incomplete" must be removed within one month from the opening of the following semester, or it becomes a "condition."

A "condition" not made up before the subject is offered again becomes a "failure," subject to rules governing failures. "Failures" must be pursued again in class. A student who at any time is deficient in more than half a year's work loses his class rank and is regarded as a member of the next lower class. Students whose absences in any term exceed four weeks in the aggregate, are not permitted to take the term examinations without special permission of the faculty.

FAILURE TO KEEP UP WITH THE CLASS

Any student receiving conditions or failures in 60 per cent of the work the first semester shall be dropped from the rolls and shall not be allowed to re-enter the University until the opening of the following year.

Any student failing to pass in one-half of the work of any year shall not be allowed to register until reinstated by action of the faculty upon recommendation of the committee on students' work.

FEEES

All students in the college, who are residents of the state, are charged an incidental fee of ten dollars a semester. Non-residents are charged double the fee required of residents of the state, or twenty dollars a semester. No reduction is made for late entrance or for leaving before the end of the semester. Save in the case of the first registration, the incidental fee is increased by twenty-five cents for each day's delay in registration beginning with the first day set for recitations. The usual fees for shop work are required of students in manual training.

COURSE OF STUDY

The College of Education offers a two-year course of study leading to the degree of Bachelor of Arts *in Education*. The preparation for teaching, which is afforded in these two years, in addition to two years of previous collegiate study, is planned to include first of all a thorough grounding in the correct use of English, both spoken and written. No student should propose to go into his work without adequate training of this kind no matter what subjects he himself expects to teach and no one will be graduated from the College of Education who has not attained a satisfactory standard in this particular.

A second element in the preparation of the future teacher is found in the courses in general and educational psychology, in the history and the organization of schools, in educational theory, and in the practice of teaching. Courses in psychology and in the history of education must be pursued by all students and additional courses are elective in the theory and the practice of elementary and of secondary teaching, in the history of secondary education, in school organization and law, and in school hygiene.

A third part of the teacher's training is found in the specific subjects which he proposes to teach. In this particular the standard in Minnesota schools is constantly rising and year by year school trustees are asking of all high school teachers more definite and adequate preparation in the subjects assigned them. This preparation is not possible unless the prospective teacher selects his subjects early in the college course and effects also a desirable and natural combination. When this is done the work required for a bachelor's degree may be arranged to give both a liberal and a special training.

A third year of study leads to the degree of Master of Arts. The work of this year includes advanced studies in education and in philosophy, and in one or more of the subjects of the secondary curriculum at the option of the candidate. The course is planned especially for those holding the degree of Bachelor of Arts who desire to prepare themselves more carefully either for high school teaching or for work as principals and superintendents. Young men and young women who propose to take up this work permanently will find it advisable to do graduate study either immediately upon receiving the bachelor's degree or after a period of practical experience in teaching.

THE DEGREE OF BACHELOR OF ARTS IN EDUCATION

The degree of Bachelor of Arts *in Education* is granted to candidates on the following conditions:

A. The completion of college courses amounting to one hundred and ~~twenty-six~~ (126) credits, in addition to the required exercises in drill, gymnasium and physical culture. The courses selected must be approved by the committee in charge. No student shall elect less than fifteen or more than eighteen hours per week without special permission.

A credit is one hour per week through one semester.

B. At least fifteen (15) credits shall be secured in Education, including courses 1 and 2.

C. An amount of work shall be taken in at least three departments concerned with the studies of the secondary curriculum sufficient to secure one major and two minor recommendations. Each minor recommendation will require not less than twelve (12) credits and each major not less than eighteen (18) credits in one department.

D. Each candidate for graduation must show an average of scholarship through four years of college work indicated by at least as many marks of "good" as of "pass," and must be counted as "good" by the department which recommends him.

E. A maximum of twelve credits is elective from the laboratory and shop courses in the manual arts and agriculture, but, in addition, credit is allowed for allied courses toward the bachelor's degree, in the case of students who desire to specialize in manual training, domestic art, domestic science or agriculture.

GRADUATION "WITH DISTINCTION"

The bachelor's degree "with distinction" is granted to students of this college on the following conditions:

A. The degree "with distinction" is based on special excellence in the major subject.

B. Students who wish to be candidates for this degree must register before the beginning of the senior year, and are advised to register upon entering the college.

C. At the time of application the student must have an average of "good" in all of his previous work. (For the purpose of this count one "excellent" shall balance one "pass").

D. To receive the degree "with distinction" the student must meet all the conditions applying to the ordinary degree, must show a record higher than "pass" in four-fifths of all his work, must present a satisfactory thesis upon his major subject by May first of the senior year, must comply with the special requirements of the department chosen, must be recommended to the faculty for special excellence, and be approved by the vote of the faculty.

OBSERVATION AND PRACTICE TEACHING

The critical observation of good teaching and the practice of teaching under skilled supervision form a most important part of the preparation of the teacher. In connection with two courses on the practice of elementary and secondary teaching, opportunity has been given students during the past two or three years to observe and to discuss the best methods of teaching employed in the public schools of Minneapolis, St. Paul, and adjacent towns. This plan was adopted as the only feasible substitute at that time for adequate opportunities in the way of observation and of practice. These opportunities, it was recognized from the first, can be furnished only in a school organized under the direct control of this college.

In November, 1907, a small school was installed in temporary quarters provided by the regents, and during that academic year classes were conducted in seventh grade and in eighth grade work. In September, 1908, the school will, it is expected, be ready to admit pupils from the sixth grade and the ninth grade also, and thereafter, as facilities may be organized, the courses of the school will be extended up through the high school years and down through the elementary years. The primary purpose in this school is to afford prospective high school teachers an opportunity for seeing the work of the secondary schools conducted under normal conditions in as efficient a way as possible, in order that they may gain by observation and, to some extent, by practice familiarity with the instruction and management proper to a school of this grade. In addition, a fully graded elementary school, with kindergarten, ungraded room, and a three grade group is planned as a place of observation and practice for prospective school principals and superintendents.

The elementary and high school for observation and practice in connection with the training of teachers is the prime condition of success. To organize this adequately means buildings of considerable size, suitable and sufficient furniture and equipment, school libraries, laboratories, shops, gardens, and playgrounds. To secure this is the first aim and desire of the college. Meanwhile, the fullest use will be made of the temporary facilities, which are all that, during this year, the governing board is able to provide.

COMMERCIAL TRAINING

No definite course is now prescribed for those who are planning to teach business subjects (including commercial geography) in the high schools, but all are advised to take at least a three years' course in economics and to elect courses also in political science and in history.

Each student is advised further to select work in rhetoric, in English literature, and in one modern foreign language.

Students who expect to teach commercial geography will do well to select courses in some of the following subjects: essentials of physical geography, advanced general chemistry, industrial botany, economic zoology, applied geology, and anthropology. In economics courses are suggested in economic geography, in industrial and commercial history, the principles of accounting, and the elements of business law. These are general suggestions for those who wish to prepare themselves for the teaching of commercial subjects, but each candidate should very early consult with the committee in regard to the outlining of his entire course.

MANUAL TRAINING

The increasing demand for teachers who are able not only to handle two or three of the ordinary high school subjects, but also to direct the manual training work of the elementary and of the high school grades, is straining the facilities of our training schools for teachers in Minnesota. This college is not yet in a position to provide adequate facilities, but in co-operation with the College of Engineering is able to offer at least introductory courses of this kind. Young men who desire to prepare themselves for manual training work may register in the college for courses of this description. By utilizing the shops on the campus and other opportunities here offered, future manual training teachers may prepare themselves both in woodwork and in ironwork. With these, students may also unite courses in descriptive geometry, in mechanical drawing, and in allied subjects, and in this way they may secure a fairly satisfactory preparation for the teaching of these branches in connection with some of the regular high school studies.

DOMESTIC ART AND DOMESTIC SCIENCE

These subjects are being added each year to the school course in an increasing number of Minnesota towns. So far superintendents and boards of education have experienced considerable difficulty in securing teachers in these lines. The larger towns and cities can engage trained teachers and supervisors, but in the smaller communities on the first introduction of these subjects, it is necessary to entrust them to teachers able to give instruction in some high school studies.

A good opportunity, therefore, lies before prospective teachers, who in addition to a preparation in the ordinary studies of the high school course will prepare for the direction of these subjects. Students, who are interested in this line of work, will be directed early in their college course in the selection of foundation work in geography, chemistry, physics and

other related subjects, and will thus be prepared to elect during the last year or two the more technical instruction in domestic art and domestic science.

SATURDAY CLASSES AND COLLEGE EXTENSION COURSES

The college has offered during the past year a number of professional courses for those actually engaged in teaching, and most of this work has been organized for Saturdays and for the latter part of the afternoon on other days of the week. Teachers of Minneapolis and of St. Paul have registered in considerable numbers for this work, and teachers have come also from smaller adjacent towns. The courses arranged on the campus of the university for teachers will be continued and increased in number during the coming year.

Extension courses by members of the college faculty were given during 1907-8 in St. Paul under the auspices of a citizens' committee, and under the immediate direction of the city superintendent. Lectures on literature, anthropology, on general and on educational psychology, and on the history of education were given each week through the school year, and the enrollment in the courses was large. The college plans to make available, as far as possible, its resources in teachers and equipment to all the school systems of Minnesota, particularly those of towns in the neighborhood of the Twin Cities. It will be possible, from time to time, to secure from the college a series of weekly or fortnightly lectures upon almost any of the ordinary branches of higher study.

THE UNIVERSITY SUMMER SCHOOL

The summer school which has been held at the university for more than fifteen years is under the direction, not of the regents, but of the state department of public instruction. There is no official connection, therefore, between the summer school and the College of Education, but the school has been planned for many years especially to suit the needs and desires of Minnesota teachers, and in the college section the courses are arranged for teachers in state high schools who desire further preparation for their work. At the same time graduate courses are provided in connection with the school for teachers, principals, and superintendents who cannot attend during the academic year, and undergraduate courses leading to the degree of bachelor of arts are also provided for teachers. Men and women who have not completed the requirements for the bachelor's degree are enabled in this way to supplement their previous studies and to bring themselves where a few months of resident study will enable them to finish their college course. The courses provided during

this six weeks' session in June and July are given to a considerable extent by members of the faculty of this college.

LIBRARY FACILITIES

The professional library of the college contains a large selection of works on the various phases of education and is at the service not only of the students of the college, but of visiting teachers. During the coming year a text-book collection will be added covering the field of secondary schools. As soon as possible this illustrative library will be supplemented by model equipment of other kinds, thus offering concrete suggestions on questions of school furnishing and supplies.

Under certain restrictions the use of part of the professional library will presently be made possible for non-resident students.

THE DEGREE OF MASTER OF ARTS

Graduates of the University of Minnesota and of other institutions of equal rank will be admitted to work leading after one year of study to the degree of Master of Arts, upon the usual conditions attaching to that degree. They will be expected, however, to have given considerable attention in their collegiate work to psychology, and to the history, the theory and the practice of teaching.

Men and women actually engaged in teaching in Minnesota and possessing the bachelor's degree from a college of good rank will be allowed to pursue graduate studies *in absentia*. For non-resident students a special course is arranged with education as the major subject. Two years are required and three are allowed for the completion of this work.

THE UNIVERSITY TEACHERS' CERTIFICATE

The University Teachers' Certificate is granted to all graduates of the College of Education and to those graduates of the College of Science, Literature, and the Arts who complete one course in general psychology and three courses in education, including courses 1 and 2, and who secure on the basis of excellent scholarship one major recommendation as qualified for teaching from a department of that college concerned with some branch of the secondary curriculum.

SPECIAL LECTURES

In addition to the courses announced for the College of Education, special lectures will be given from time to time, open to all students, by men closely identified with public education in Minnesota. Educational organization, ideals and methods, will be treated from the point of view of those concerned with the state department of public instruction, the

inspection of state graded and high schools, the state normal schools, city school systems, and with the conduct of schools in smaller communities.

Public lectures will be given also by men familiar with the educational conditions, experiments, and tendencies in other states.

THE EDUCATIONAL CLUB

This organization is made up of those giving instruction in the College of Education and of students registered for advanced work. Meetings are held from time to time during the college year for the discussion of current questions in education and for reports and discussions upon recent educational literature, books, magazines and journals.

COURSES OF INSTRUCTION

Fuller descriptions of some of the courses offered may be found in bulletins of the College of Science, Literature and the Arts, the College of Engineering, the School of Chemistry and the College of Agriculture.

SEQUENCE OF SUBJECTS

The subjects in the following announcement are arranged in this order :

- I. Education
- II. English Literature and Rhetoric
- III. Ancient Languages—(a) Greek, (b) Latin
- IV. Modern Languages—(a) German, (b) French
- V. Biological Sciences—(a) Animal Biology, (b) Botany
- VI. Physical Sciences—(a) Chemistry, (b) Physics, (c) Geology
- VII. Mathematical Sciences, (a) Astronomy, (b) Mathematics
- VIII. Philosophy and Psychology
- IX. Economics, Political Science, History and Sociology
- X. Drawing, Music
- XI. Agriculture, Domestic Art and Science, and Manual Training.

Courses of Study

EDUCATION

1. HISTORY OF EDUCATION TO THE REFORMATION

ASSISTANT PROFESSOR

SWIFT

Three credits

First semester

Open to juniors and seniors.

An introductory study in the history of education conducted by lectures, assigned readings, discussions and reports. The purpose of the course is to arouse an interest in educational problems, to secure some perspective for use in current investigation, with some command of the facts of educational history, and some ease in the methods of historical study. An attempt is made to bring out education as one phase of civilization and to show the connection of schools with other social institutions. Attention will be given especially to an examination of the schools of Greece and of Rome, the education of the early Christian centuries, the development of the different types of schools in Medieval times, the rise of the university and of the humanistic schools of the Renaissance.

2. HISTORY OF MODERN EDUCATION

ASSISTANT PROFESSOR SWIFT

Three credits

Second semester

Open to juniors and seniors who have completed course 1.

A somewhat intensive study of the periods in the history of modern education, with special reference to the development of the various national systems of public instruction. Different types of educational theory are considered in connection with a study of the men who first advanced them, and of the schools in which they were first put into effect. This course is a direct preparation for an understanding of the educational systems, theories, and practices of the present.

3. EDUCATIONAL PSYCHOLOGY

ASSISTANT PROFESSOR MINER

Three credits

First or second semester

Open to juniors who have completed philosophy 1.

Identical with philosophy 2.

The study of mental development in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

4. SECONDARY EDUCATION

PROFESSOR JAMES

Three credits

First semester

Open to seniors who have completed courses 1 and 2.

A study of secondary education in the United States, with such references to the secondary schools of other countries as will lead to a clearer understanding of the place and function of the high school, its curriculum, the problems of present-day importance, and the relation of the high school to other parts of the system of public instruction. The course will be conducted by lectures, reports and discussions.

5. PRINCIPLES AND ORGANIZATION OF ELEMENTARY TEACHING

PROFESSOR RANKIN

Three credits

First semester

Open to seniors who have completed courses 1 and 2 and philosophy 1.

This course includes a consideration of the course of study of the elementary school and of the best methods of instruction. It is conducted by means of lectures, assigned readings, discussions and reports. It is planned for all students who expect to teach in the high schools or to be principals or superintendents. No credit is given in this course to graduates of normal schools, who have received one year's credit at the university.

6. PRINCIPLES AND ORGANIZATION OF SECONDARY TEACHING

PROFESSOR RANKIN

Three credits

Second semester

Open to seniors who have completed courses 1 and 2 and who have completed course 4 or are pursuing course 10.

This course includes lectures on the general methods of secondary teaching, assigned readings, reports, and discussions. It is planned more particularly for those who expect to teach in high schools.

7. THE THEORY OF EDUCATION

PROFESSOR JAMES

Three credits

First semester

Open to juniors and seniors who have completed philosophy 1.

An introductory course in educational theory, including a somewhat detailed study of the principles on which is based the present practice in teaching. No credit is given in this course to graduates of normal schools who have received one year's credit at the university.

8. SCHOOL ADMINISTRATION

PROFESSOR RANKIN

Three credits

First semester

Open to seniors who have completed courses 1 and 2.

An introductory study of school administration, conducted by lectures, reports and discussions; the organization of school systems, the work of school boards, superintendents, principals and teachers, school buildings, and hygiene. This course is planned for students without any teaching experience, who hope later to do work in supervision.

9. SCHOOL SUPERVISION

PROFESSOR RANKIN

Three credits

Second semester

Open to seniors; intended only for students with experience in teaching.

An advanced course treating of the duties of school principals and superintendents. Credit will not be given both for course 8 and for course 9.

10. COMPARATIVE STUDY OF SCHOOL SYSTEMS

PROFESSOR JAMES

Three credits

Second semester

Open to seniors who have completed courses 1 and 2.

This course deals with the school systems of Germany, France, England and the United States, with special reference to principles and methods of administration. Elementary, secondary and higher institutions are examined with emphasis varying in successive years. The course is conducted partly by lectures and partly by assigned readings, reports and discussions.

11. MODERN EDUCATIONAL THEORIES

PROFESSOR JAMES

Three credits

Second semester

Open to seniors who have completed courses 1 and 2 and philosophy 1.

An advanced course in educational theory, dealing particularly with the contributions of Rousseau, Froebel and Herbart, special emphasis being laid upon one of these writers in each successive year.

12. **CURRENT PROBLEMS IN ELEMENTARY TEACHING** PROFESSOR RANKIN
 Two credits First semester
 Open to seniors who have completed course 5 and to graduate students.
 This is a seminar course, involving a general discussion of some current problems in elementary education, one or two of which are worked out practically by the student under the direction of the instructor, through readings, the visiting of schools and through class discussions.
13. **EDUCATIONAL CLASSICS** PROFESSOR JAMES
 Two credits First semester
 Open to seniors who have completed courses 1 and 2, and to graduates.
 A seminar course for the reading of selected educational classics and for the detailed study of corresponding periods in educational history.
14. **CURRENT PROBLEMS IN SECONDARY TEACHING** PROFESSOR RANKIN
 Two credits Second semester
 Open to seniors and to graduate students who have completed course 6.
 This is a seminar course for advanced students, preferably with teaching experience, who wish to pursue a theoretical and a practical study of some current problem in connection with secondary teaching. The course will be conducted by lectures, class discussion, readings and by the visiting of schools.
15. **PROBLEMS IN SCHOOL ADMINISTRATION** PROFESSOR JAMES
 Two credits Second semester
 Open to seniors and to graduate students who have completed courses 1 and 2.
 A research course for advanced students, preferably with teaching experience, who desire to take up the investigation of some question of educational administration. The course will be conducted by lectures, class discussions, assigned readings, and, when possible, by a study of actual school conditions, falling within the proposed field.
16. **SCHOOL SANITATION** PROFESSOR RANKIN
 Two credits First semester
 Open to seniors and to graduate students.
 This course will be conducted by text, by lectures, and by investigation into the problems of school lighting, heating, and ventilation, and other questions of school architecture and management connected with the physical well-being of the pupils.
17. **ORGANIZATION OF HIGHER EDUCATION** PROFESSOR JAMES
 One credit Second semester
 Open to seniors and to graduate students who have completed courses 1 and 2.
 This course is intended for students who are interested in the general problems of educational administration, and who look forward later to college teaching. It includes a historical sketch of the development of the American university, with discussions of modes of organization and administration, problems of departmental management, and questions of class instruction.

18. PRACTICE TEACHING

PROFESSOR RANKIN

Three credits

First or second semester

Open only to seniors and to graduate students.

The registrar will accept enrollment only on written permission to the student from the instructor in charge, specifying one of the morning periods to be kept free for this work on each day of the week; five periods of teaching and Saturday conference; not counted as one of the five courses in education required for graduation.

This is a course in observation and practice teaching, related for the present to the work of the advanced grammar and first high school grades. As facilities permit, the work of other grades will be added.

19. TECHNIQUE OF READING

MR. HOLT

Three credits

First or second semester

Open only to a limited number of seniors after individual tests by the instructor.

This course is given in two sections for those who are specializing in this work and for those noticeably deficient in voice control.

ENGLISH LANGUAGE AND LITERATURE

ENGLISH

1. OUTLINE OF ENGLISH LITERATURE

PROFESSOR BURTON, ASSISTANT

PROFESSORS PECK AND BEACH

Three credits

First semester

Open to all.

Full credit only for freshmen, who must complete course 2 before credit for this will be allowed.

An outline sketch of the main personalities of English literature, from the earliest times to the present.

2. OUTLINE OF AMERICAN LITERATURE

PROFESSOR BURTON, ASSISTANT

PROFESSORS PECK AND BEACH

Three credits

Second semester

Open to freshmen who have completed course 1, and at half credit to sophomores, juniors, and seniors; not credited toward a minor in English.

A study of the salient figures of our native literary development; special attention is given to contemporary writers.

3. EARLY ENGLISH

PROFESSOR KLAEBER, MR. FIRKINS

Six credits

Both semesters

Open to sophomores, juniors, and seniors. The first semester is required of all who take a major or obtain a teacher's certificate in English.

A study of the language and reading of representative selections of Old English prose and poetry; the relation to the modern English will be particularly emphasized.

4. INTRODUCTION TO MIDDLE ENGLISH LANGUAGE AND LITERATURE

PROFESSOR KLAEBER

5. **PIERS THE PLOWMAN** PROFESSOR KLAEBER
 Two credits First semester
 Open to sophomores, juniors, and seniors who have completed
 the first semester of course 3; alternates with course 4;
 not given in 1908-9.

6. **CHAUCER** ASSISTANT PROFESSORS PECK AND BEACH, AND
MR. FIRKINS
 Three credits First semester
 Open to sophomores.
 A study of the grammar and literary forms of fourteenth cen-
 tury English, with selected readings from Chaucer's works;
 special attention is given to the Canterbury Tales.

7. **SPENSER** ASSISTANT PROFESSORS PECK AND BEACH, AND
MR. FIRKINS
 Three credits Second semester
 Open to sophomores.

8. **OUTLINE OF EIGHTEENTH CENTURY LITERATURE** ASSISTANT PROFESSOR BEACH
First Semester
 Three credits
 Open to sophomores and juniors who have completed one year of
 work in English.

9. **OUTLINE OF NINETEENTH CENTURY LITERATURE** ASSISTANT PROFESSOR
BEACH
 Three credits Second semester
 Open to sophomores and juniors who have completed one year of
 work in English.

10. **EARLY NINETEENTH CENTURY POETRY** MR. FIRKINS
First semester
 Three credits
 Open to juniors.
 A course in forms and literary influence of the early nineteenth
 century, with a critical study of selected readings from Words-
 worth, Coleridge, Byron, Shelley, and Keats.

12. **THE ENGLISH NOVEL** PROFESSOR POTTER
First semester
 Three credits
 Open to juniors and seniors who have completed one year of work
 in English.

13. **THE BIBLE AS LITERATURE** PROFESSOR POTTER
Second semester
 Three credits
 Open to sophomores, juniors, and seniors.

14. **MILTON** PROFESSOR POTTER
First semester
 Three credits
 Open to juniors who have completed one year of work in
 English, preferably courses 6 and 7.

15. **SHAKESPEARE** PROFESSOR POTTER
Second semester
 Three credits
 Open to juniors who have completed one year and a half in
 English, preferably courses 6, 7 and 14.

16. **CONSTRUCTION AND DEVELOPMENT OF THE MODERN DRAMA**
ASSISTANT PROFESSOR PECK
Both semesters
 Six credits

Open to seniors who have completed two years in English, including course 15.

18. **TEACHERS' COURSE IN ENGLISH** PROFESSOR POTTER
Two credits Both semesters
Open to seniors who have completed courses 6, 7, 14, and 15; both semesters must be completed before credit is allowed for the first semester.
19. **THE DEVELOPMENT OF LITERARY CRITICISM** PROFESSOR BURTON
Two credits Both semesters
Open to juniors and seniors; both semesters must be completed before credit is given for the first semester.
20. **ENGLISH PROSE** PROFESSOR BURTON
Three credits First semester
Open to juniors and seniors who have completed one year of English.
21. **BROWNING AND TENNYSON** PROFESSOR BURTON
Three credits Second semester
Open to juniors and seniors who have completed one year of English.
22. **HISTORY OF THE ENGLISH LANGUAGE** PROFESSOR KLAEBER
One credit Second semester
Open to sophomores, juniors, and seniors, who have completed the first semester of course 3; required of all who take their major or obtain a teacher's recommendation in English.

Courses 3 (first semester), 6, 7, 14, 15, 18 and 22 are prescribed for those who offer a major in English toward graduation, with six additional credits in English, and course 2 in rhetoric. Three years in English will be required for a minor in this college, the courses to be selected after consultation. Students may select extra courses from any work announced by the English department.

RHETORIC AND ELOCUTION

1. (a) **RHETORIC** MR. FIRKINS AND MR. NICHOLS
Six credits Both semesters
Open to all; but juniors and seniors must obtain the consent of the department, and will receive only half credit.
- (b) **ARGUMENTATION** MR. GISLASON
Six credits Both semesters
Open to freshmen and sophomores who are recommended by the department.
2. (a) **RHETORIC** MR. FIRKINS, MISS MALEY, AND MISS WHITNEY
Six credits Both semesters
Open to freshmen who have obtained a grade of "excellent" upon the entrance examination in English, and to sophomores, juniors, and seniors who have completed course 1.
- (b) **ARGUMENTATION** MR. GISLASON
Six credits Both semesters
Open to sophomores, juniors, and seniors who have completed course 1, and have had some previous experience in debate.
3. **LITERARY CRITICISM** PROFESSOR SANFORD
Three credits First semester
Open to sophomores (by special permission), juniors, and seniors who have completed course 1.

4. **ART LECTURES** PROFESSOR SANFORD
 Three credits Second semester
 Open to sophomores (by special permission), juniors, and seniors
 who have completed course 1.
5. **DEBATE** PROFESSOR SANFORD
 Six credits Both semesters
 Open to juniors and seniors who have completed courses 1 (b)
 and 2 (b); not offered in 1908-9.
6. **ADVANCED RHETORIC** ASSISTANT PROFESSOR COMSTOCK
 Six credits Both semesters
 Open to juniors and seniors who have completed courses 1 and
 2. This course should be taken by all who expect to teach
 English in the secondary schools.
7. **ADVANCED RHETORIC** ASSISTANT PROFESSOR COMSTOCK
 Six credits Both semesters
 Open to juniors and seniors who have completed courses 1, 2
 and 6.
8. **READING** PROFESSOR SANFORD
 Six credits Both semesters
 This course carries three credits each semester for sophomores only.
 The object of this course is voice building and training in
 interpretation and expression. The text used is Shakespere's
 plays.
9. **VOCAL EXPRESSION**
 Six credits Both semesters
 Open to juniors and seniors who have completed course 1; not
 offered in 1908-9.
10. **PSYCHOLOGICAL SIDE OF VOCAL EXPRESSION**
 Six credits Both semesters
 Open to juniors and seniors who have completed course 1; not
 offered in 1908-9.
11. **AMERICAN ORATORY**
 Six credits Both semesters
 Open to juniors and seniors who have completed course 1; not
 offered in 1908-9.

Courses 1, 2, 3 and 6, are prescribed for those who offer a major in rhetoric toward graduation in this college, and these credits must be supplemented by at least three years of approved work in English.

GREEK

In addition to at least two of the preliminary courses, students who expect to teach Greek in the high schools should take the following:

4. **ORATORY—Lysias and Demosthenes** ASSISTANT PROFESSOR SAVAGE
 Three credits First semester
 Open to those who have completed course 2 or course 3.
 The course consists chiefly of readings from Lysias and Demos-
 thenes; this work is supplemented by lectures on Greek oratory,
 and some attention is given to Greek rhetoric.

5. **PHILOSOPHY—Plato's Apology and Crito** **ASSISTANT PROFESSOR SAVAGE**
 Three credits **Second semester**
 Open to those who have completed course 2 or course 3.
 The course consists chiefly in the reading of Plato's Apology and Crito; selections from Xenophon's Memorabilia may also be read. The reading of texts is supplemented by lectures on Greek philosophy.
7. **TRAGEDY** **PROFESSOR BROOKS**
 Three credits **Second semester**
 Open to juniors and seniors who have completed course 5.
10. **ADVANCED COURSE IN EPIC POETRY—The Odyssey** **PROFESSOR HUTCHINSON**
 Three credits **Second semester**
 Open to juniors and seniors who have completed course 7.
14. **GREEK COMPOSITION** **PROFESSOR HUTCHINSON**
 Two credits **Both semesters**
 Open to juniors and seniors who have completed courses 4 and 5; both semesters must be completed before credit is given for the first semester. Recommended to those who expect to teach Greek.

Courses 4, 5, 7, 10 and 14 are prescribed for students who offer a major in Greek toward graduation in this college. Eighteen credits are required for a minor. Students who desire further courses in Greek will consult with the head of the department.

LATIN

Students who desire a recommendation to teach Latin are expected to take courses 1, 2, 3 and 4 during the first two college years.

6. **ADVANCED COURSE IN CAESAR** **PROFESSOR PIKE**
 Three credits **First semester**
 Open to those who have completed courses 1 to 4, inclusive; required for a teacher's recommendation in Latin.
 Selections from books five to seven of the Gallic War and from the Civil War; thorough study of the principles of indirect discourse; intermediate composition; approximately one hour for one half semester will be spent upon technical portions of the work, e. g. class drill work and discussion of the various problems connected with secondary school work in Latin.
7. **ADVANCED COURSE IN VIRGIL** **PROFESSOR PIKE**
 Three credits **Second semester**
 Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.
 An interpretation of selections from books seven to twelve of the Aeneid; a study of the quantitative method of pronouncing Latin verse; practice in the metrical rendering of selected passages; approximately one hour for one half semester will be spent upon the strictly technical portions of the subject.
10. **LATIN COMPOSITION** **PROFESSOR PIKE**
 Two credits **Second semester**
 Open to those who have completed courses 1 to 4, inclusive.
12. **CORRESPONDENCE OF CICERO** **PROFESSOR CLARK**
 Two credits **First semester**

Selections from the letters of Cicero, with a study of the life and history of his times.

Courses 6 and 7 are prescribed for students who offer a major in Latin toward graduation in this college. Those who desire additional work may select, on the approval of the head of the department, from other courses announced in Latin.

GERMAN

Courses 1, 2 or 3, and 5 are introductory courses. Students who present German for entrance may select courses 4 and 6 or 7 during the first two college years.

8. **ADVANCED CONVERSATION, GRAMMAR AND COMPOSITION** PROFESSOR
SCHLENKER, ASSISTANT PROFESSOR WILKIN, AND MR. SCHROEDEL
Four credits Both semesters
Open to those who have completed courses 1 and 2 or course 4;
recommended that it be preceded by course 5; required of those
who obtain a teacher's recommendation in German.
Essays on assigned subjects; oral exercises in German by
means of discussions on everyday subjects.
9. **GERMAN LITERATURE OF THE CLASSIC PERIOD** PROFESSOR MOORE
Six credits Both semesters
Open to those who have completed courses 1 and 2 (by special
permission), or 3 and 7, or 4 and 6; both semesters must be
completed before credit is given for the first semester; required
of those who obtain a teacher's recommendation in German.
10. **MODERN AUTHORS, GERMAN LITERATURE OF THE NINETEENTH CENTURY** PROFESSOR MOORE
Six credits Both semesters
Open to those who have completed courses 1, 2 and 9 (by special
permission), or 4, 6, and 9 or 3, 7 and 9; both semesters must
be completed before credit is given for the first semester;
required of those who obtain a teacher's recommendation in
German.
11. **TEACHERS' COURSE** PROFESSOR MOORE
One credit Second semester
Open to those who have completed course 10; this course is
especially designed for those who expect to become teachers of
German in high schools.

Courses 8, 9, 10, and 11 are prescribed for those who offer a major in German for graduation in this college: Eighteen credits are required for a minor, to be selected after consultation. Students may select additional work, on the approval of the head of the department, from other courses announced in German.

FRENCH

1. **BEGINNING FRENCH** ASSISTANT PROFESSORS ANDRIST AND FRELIN,
MADAME BERTIN
Ten credits Both semesters
Open to all, but juniors and seniors receive only half credit;
both semesters must be completed before credit is given for
the first semester; not counted toward a minor in French.

2. **INTERMEDIATE FRENCH** ASSISTANT PROFESSOR FRELIN AND
MADAME BERTIN
Six credits Both semesters
Open to sophomores, juniors, and seniors who have completed course 1; both semesters must be completed before credit is given for the first semester.
3. **ADVANCED FRENCH GRAMMAR AND COMPOSITION** ASSISTANT PROFESSOR
ANDRIST
Six credits Both semesters
Open to all who enter the university with two years of French; both semesters must be completed before credit is given for the first semester.
4. **BEGINNING FRENCH CONVERSATION** ASSISTANT PROFESSORS ANDRIST
AND FRELIN, AND MADAME BERTIN
Two credits Both semesters
Open only to those who have completed or are taking course 2 or course 3; both semesters must be completed before credit is given for the first semester.
5. **THE CLASSICAL PERIOD OF FRENCH LITERATURE** PROFESSOR BENTON
Six credits Both semesters
Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.
6. **ADVANCED FRENCH CONVERSATION** PROFESSOR BENTON
Four credits Both semesters
Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.
7. **FRENCH LITERATURE OF THE NINETEENTH CENTURY** PROFESSOR BENTON
Six credits Both semesters
Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.
8. **TEACHERS' COURSE IN FRENCH** PROFESSOR BENTON
Two credits Both semesters
Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.

Courses 1, 2, and 4, or courses 3 and 6, together with courses 5, 7, and 8 are prescribed for those who offer a major in French toward graduation. Eighteen credits are required for a minor.

ANIMAL BIOLOGY

1. **GENERAL ZOOLOGY** PROFESSOR SIGERFOOS, ASSISTANT PROFESSORS
OESTLUND, BROWN, AND DOWNEY
Six credits Both semesters
Open to all; the laboratory fee is three dollars per semester.
Lectures, quizzes, and laboratory work. Text book—Hertwig's Manual of Zoology. This course should be taken in the first or the second college year by all who expect to teach the subject.

2. **ADVANCED ZOOLOGY** **PROFESSOR SIGERFOOS AND ASSISTANT PROFESSOR BROWN**
 Six credits Both semesters
 Open to those who have completed course 1; both semesters must be completed before credit will be given for the first; the laboratory fee is three dollars per semester.
3. **ESSENTIALS OF HISTOLOGY AND EMBRYOLOGY** **PROFESSOR NACHTRIEB AND ASSISTANT PROFESSOR DOWNEY**
 Six credits Both semesters
 Open to those who have completed course 1; the laboratory fee is three dollars per semester.
4. **COMPARATIVE ANATOMY OF VERTEBRATES** **ASSISTANT PROFESSOR BROWN AND MR. JOHNSON**
 Six credits Both semesters
 Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester; the laboratory fee is three dollars per semester.
5. **GENERAL PHYSIOLOGY** **PROFESSOR NACHTRIEB**
 Six credits Both semesters
 Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.
 In the first semester are considered the physical, structural, and functional features of living substance and the cell, present conditions and expressions of life, and the theories of the origin of life and death. In the second semester the life of the cell is considered in its relations to that of other cells, and the course is concluded with special reference to the teaching of physiology in our high schools.
 Demonstrations and simple experiments constitute a part of the course in both semesters.
13. **TEACHERS' COURSE** **PROFESSOR NACHTRIEB AND ASSISTANTS**
 One credit First semester
 Open to those who have completed a minor in zoology; given in alternate years.
 Lectures and discussions on the ends to be attained through courses in general zoology, and on the methods and means by which such ends may be gained.
- Course 1, and courses 2, 3, 4, 5, or 15 are prescribed with course 13. for students who offer a major in animal biology toward graduation, and six other credits in animal biology are required, together with a year in botany. Students may select additional work, on the approval of the head of the department, from other courses announced in animal biology.

BOTANY

1. **GENERAL BOTANY** **PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL, AND ASSISTANTS**
 Six credits Both semesters
 Open to all; both semesters must be completed before credit will be given for the first semester; the laboratory fee is three dollars per semester.
2. **ADVANCED BOTANY** **PROFESSOR CLEMENTS, ASSISTANT PROFESSORS TILDEN AND ROSENDAHL, AND MISS MISS**
 Six credits Both semesters
 Open to those who have completed course 1; the laboratory fee is three dollars per semester.

3. **PHYSIOLOGY AND ECOLOGY** PROFESSOR CLEMENTS AND MR. HUFF
Six credits Both semesters
Open to those who have completed courses 1 and 2; by permission of the department the course may be taken in conjunction with course 2; the laboratory fee is three dollars per semester.
4. **ALGAE** ASSISTANT PROFESSOR TILDEN
Six credits Both semesters
Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.
5. **FUNGI** PROFESSOR CLEMENTS AND MISS HONE
Six credits Both semesters
Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.
6. **MOSSES AND FERNS** ASSISTANT PROFESSOR ROSENDAHL AND MR. HUFF
Six credits Both semesters
Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.
16. **TEACHERS' COURSE—Plant Studies and Methods** PROFESSOR CLEMENTS
Six credits Both semesters
Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.
A course for teachers and for students intending to teach; the subjects of nature study and high school botany are presented as they are to be taught, and not from the university point of view. The material is taken up in detail, in its proper sequence, and training in method is afforded, as far as possible, by practice in the elementary school of the College of Education.

Courses 1, 2, and 16 are prescribed for students who offer a major in botany toward graduation, and these must be supplemented by at least one year in animal biology. Students may select additional work, on the approval of the head of the department, from other courses announced in botany.

CHEMISTRY

1. **GENERAL CHEMISTRY** MISS COHEN AND MR. BADGER
Six credits Both semesters
Open to all who do not present any entrance credits in chemistry; but juniors and seniors receive only half credit; both semesters must be completed before credit is given for the first semester; the laboratory fee is five dollars per semester.

Recitations and laboratory work; the course includes a study of the common elements and their compounds, with an introduction to the modern theories of chemistry.
2. **ADVANCED GENERAL CHEMISTRY** PROFESSOR FRANKFORTER
Six credits Both semesters
Open to all who have completed a satisfactory course in general chemistry; both semesters must be completed before credit is given for the first semester; the laboratory fee is five dollars per semester.

Lectures and laboratory work; the ground covered includes an introduction to physical and technological chemistry, with an exhaustive study of the chemical elements.

3. **QUALITATIVE ANALYSIS** PROFESSOR NICHOLSON AND MR. FRARY
 Six credits Both semesters
 Open to those who have completed course 2; the laboratory fee is five dollars per semester.
 Lectures and laboratory work, with recitations and collateral reading. The course includes the general reactions of the metals and the acids, with their qualitative separation. Beside this mechanical work, the ionic theory and the law of mass action are discussed with special reference to common qualitative reactions.
4. **QUANTITATIVE ANALYSIS (Gravimetric)** PROFESSOR SIDENER
 Three credits First semester
 Open to those who have completed course 3; the laboratory fee is five dollars.
 Lectures and laboratory work. The course includes an introduction to quantitative and the beginning of gravimetric analysis.
5. **QUANTITATIVE ANALYSIS (Volumetric)** PROFESSOR SIDENER
 Three credits Second semester
 Open to those who have completed course 4; the laboratory fee is five dollars.
 Lectures and laboratory work. The course includes an introduction to volumetric analysis, with a discussion of standard solutions and the necessary stoichiometric calculations.
6. **ORGANIC CHEMISTRY** PROFESSOR FRANKFORTER
 Six credits Second semester
 Open to those who have completed course 3; the laboratory fee is ten dollars.
 Lectures and laboratory work. The course includes an exhaustive study of the theories of organic chemistry, with one or more important preparations in each of the advanced series and groups of compounds.
7. **TEACHERS' COURSE** MISS COHEN
 One credit Second semester
 Open to seniors who have completed course 3; this course is especially arranged for students who expect to teach.
 The course will be largely didactic, with experimental work necessary to a thorough understanding of the new methods and theories.

Courses 1, 2, 3, and 7 are prescribed for students who offer chemistry as a major toward graduation in this college, together with at least six credits in physics. Students who enter with credit in chemistry may offer course 4 instead of course 1.

PHYSICS

1. **GENERAL PHYSICS** PROFESSOR JOHN ZELENY
 Three credits First semester
 Open to sophomores, juniors, and seniors; may be taken separately or in conjunction with course 2.
 Mechanics of solids and fluids, heat and sound. This is the first part of a general course in physics; the treatment is experimental rather than mathematical; the course is designed to give the students a general knowledge of the fundamental principles of the subject, and will be found especially useful to those pursuing other sciences. There will be one experimental lecture and two recitations each week.

2. GENERAL LABORATORY PRACTICE

MR. KOVARIK

One credit

First semester

Open to sophomores, juniors, and seniors who have completed or are taking course 1; the laboratory fee is three dollars.

Physical measurements in the mechanics of solids and in heat and sound, giving the student a knowledge of experimental methods.

3. GENERAL PHYSICS

PROFESSOR JOHN ZELENY

Three credits

Second semester

Open to sophomores, juniors, and seniors who have completed course 1; may be taken separately or in conjunction with course 4.

Light, electricity and magnetism. This is the second part of a general course in physics; the treatment is experimental, and the fundamental principles of the subject, including those of radioactivity, ionization and radiation, and the electrical constitution of matter are discussed and illustrated. There will be one experimental lecture and two recitations each week.

4. GENERAL LABORATORY PRACTICE

MR. KOVARIK

One credit

Second semester

Open to sophomores, juniors, and seniors who have completed or are taking course 3; the laboratory fee is three dollars.

Physical measurements in light, electricity, and magnetism, giving the students a knowledge of experimental methods.

5. ADVANCED GENERAL PHYSICS

PROFESSOR JONES, ASSISTANT PROFESSORS

ANTHONY ZELENY, AND ERIKSON

Six credits

First semester

Open to sophomores, juniors, and seniors who have completed mathematics 4 (trigonometry); the laboratory fee is three dollars. Adapted to those students who expect to specialize in physics, to teach science, or to enter upon a technical course.

Mechanics of solids and fluids; the properties of matter, heat, and sound. This course is intended to give a thorough training in general physics, and includes the solution of numerous problems; there will be two lectures, three recitations, and one laboratory (double) period each week.

6. ADVANCED GENERAL PHYSICS

PROFESSOR JONES, ASSISTANT PROFESSORS

ANTHONY ZELENY, AND ERIKSON

Six credits

Second semester

Open to sophomores, juniors, and seniors who have completed course 5; the laboratory fee is three dollars. Intended for those students who wish to specialize in the science, to teach the subject, or to enter upon a technical course.

Light, electricity and magnetism. This course completes the work in general physics; there are two experimental lectures, three recitations, and one double laboratory period each week.

20. TEACHERS' COURSE

PROFESSOR JONES

One credit

Second semester

Open to seniors who have completed courses 1 to 4, inclusive, or courses 5 and 6.

No special matter is discussed, but methods of presentation and the selection of lecture material and laboratory experiments are considered; the work is conducted by the students under the supervision of the instructor.

Courses 1 to 4, inclusive, and course 20, with four other credits in this department and six credits in chemistry are prescribed for those who offer a major in physics toward graduation in this college; students may offer courses 5 and 6 in lieu of courses 1 to 4, inclusive.

GEOLOGY

- 1. GENERAL GEOLOGY** **PROFESSOR HALL**
Three credits First semester
Open to juniors and seniors.
This course comprises: (1) geodynamics, (2) structural geology, (3) physiographic geology, (4) an outline of historical geology. Lectures and conferences, illustrated by photographs, maps, profiles, and lantern slides.
- 2. ESSENTIALS OF PHYSICAL GEOGRAPHY** **ASSISTANT PROFESSOR LEHNERTS**
Three credits First semester
Open to juniors and seniors.
A discussion of earth sculpture and description of the structural features of continents, with special reference to the ethnic movements and commercial activities of mankind.
- 3. INDUSTRIAL GEOGRAPHY** **ASSISTANT PROFESSOR LEHNERTS**
Three credits Second semester
Open to juniors and seniors who have completed course 1 or course 2.
The structural features of the North American continent outlined as an introduction; following this is a study of the types of soil and dominating climatic characters of the several agricultural regions of the continent; a discussion of the geography of industries as they have grown up within the past hundred years and their dependence upon physiographic conditions; a study of local industries effected through excursions and reports; a brief survey of industries in other parts of the world parallels the more detailed study of North America; throughout the course cause and effect are kept in view.
- 4. ELEMENTS OF METEOROLOGY** **ASSISTANT PROFESSOR LEHNERTS**
Three credits Second semester
Open to juniors and seniors who have completed course 1 or course 2.
The general principles of meteorology are treated, embracing the properties and phenomena of the atmosphere, including an explanation of the ordinary observations of pressure and temperature, together with a more extended study of the apparatus and practice of a weather bureau office. This is followed by a study of storms and climatic elements generally; the conditions of climatic changes are studied and the influence of physiographic conditions is discussed. Text book, lectures, and reference reading.
- 5. GEOGRAPHY AND GEOLOGY OF MINNESOTA** **PROFESSOR HALL**
Three credits Second semester
Open to juniors and seniors who have completed course 1.
(a) The physical geography of the state in its relations to geological history and industrial development; (b) a study of the principles and facts of pre-Cambrian geology as exemplified within the state, and the extension of these into general application; (c) the present problems of the state in agriculture, drainage, water power, mining, quarrying, etc., are considered in some detail.
- 6. HISTORICAL GEOLOGY** **ASSISTANT PROFESSOR SARDESON**
Three credits Second semester
Open to juniors and seniors who have completed course 1, course 7, or course 8.
A course in historical geology, including a study of the more important types of fossils in their geological relations; a

history of the North American continent in particular is considered; lectures and demonstrations.

15. **THE METHOD AND MATERIAL OF GEOGRAPHY** ASSISTANT PROFESSOR
LEHNERTS
Two credits Both semesters

Open to juniors and seniors; designed especially for teachers.

The earth as an object of study in the grades and in the high school; the guiding principles; the course of study; text books and their use; practical laboratory work; excursions; collection and preparation of illustrative material; map drawing; chalk modeling; relief work; organization of geographical subject matter for class room instruction, and the method of recitation.

Students will not offer a major in geology toward graduation in this college except by special permission, but all who intend to teach any biological or physical science are advised to take at least some of the elementary courses, to be selected after consultation.

ASTRONOMY

1. **GENERAL ASTRONOMY** PROFESSOR LEAVENWORTH
Six credits Both semesters

Open to those who have completed mathematics 4 (trigonometry).

The study of the general principles of astronomy, illustrated by lantern slides and telescopic observations.

2. **PRACTICAL ASTRONOMY** PROFESSOR LEAVENWORTH
Six credits Both semesters

Open to juniors and seniors who have completed course 1, and mathematics 5, 6, and 7.

The theory and use of astronomical instruments in determining time, latitude, longitude, and positions of heavenly bodies; astronomical photography, with measurements of plates; study of the method of least squares.

MATHEMATICS

1. **FIRST PART HIGHER ALGEBRA** DR. MANCHESTER AND MR. SHUMWAY
Three credits First semester

2. **SOLID GEOMETRY** MR. MANCHESTER AND MR. SHUMWAY
Three credits (not to be given after 1908) Second semester

3. **SECOND PART HIGHER ALGEBRA** PROFESSOR BAUER, ASSISTANT PROFESSOR
BUSSEY, MR. DALAKER, DR. MANCHESTER, AND MR. SHUMWAY
Three credits First semester

4. **TRIGONOMETRY** PROFESSOR BAUER, ASSISTANT PROFESSOR BUSSEY,
MR. DALAKER, DR. MANCHESTER, AND MR. SHUMWAY
Three credits Second semester

5. **ANALYTICAL GEOMETRY** PROFESSOR DOWNEY, ASSISTANT PROFESSOR
BUSSEY, MR. DALAKER, AND DR. MANCHESTER
Three credits First semester

Open to those who have completed courses 3 and 4; courses 8 and 9 may be taken in conjunction with this course and course 6, and this is recommended to students specializing in mathematics.

- Three credits First semester
Open to those who have completed courses 3, 4, 5, and 6.
9. THEORY OF EQUATIONS Mr. SHUMWAY
Three credits Second semester
Open to those who have completed courses 3, 4, and 8; may
be taken in connection with course 6.
10. DIFFERENTIAL EQUATIONS PROFESSOR DOWNEY
Three credits Second semester
Open to those who have completed courses 1 to 7, inclusive.
13. MATHEMATICAL PEDAGOGY PROFESSOR BAUER
One credit Second semester
Open to those who have completed courses 3 and 4.
A lecture course in which special attention is paid to the
fundamental principles of algebra and geometry.

Courses 3, 4, 5, 6, 7, and 13, with either course 9 or course 10, are prescribed for students who offer a major in mathematics toward graduation in this college. Courses 3, 4, 5, and 6 are required for a minor.

PHILOSOPHY AND PSYCHOLOGY

1. INTRODUCTORY PSYCHOLOGY PROFESSOR WILDE, ASSISTANT PROFESSORS
MINER AND SWENSON, AND MR. HAYNES
Three credits First semester
Open to sophomores, juniors, and seniors.
Required for all advanced work in psychology and for the
teacher's certificate; it also serves as an introduction to the
courses in philosophy. Students who expect to teach are
advised to take this course during the second college year.
2. LOGIC PROFESSOR WILDE, ASSISTANT PROFESSOR SWENSON,
AND MR. HAYNES
Three credits First or second semester
Open to sophomores, juniors, and seniors.
3. EDUCATIONAL PSYCHOLOGY ASSISTANT PROFESSOR MINER AND MR. HAYNES
Three credits Second semester
Open to those who have completed course 1.
This course is commended to those who expect to teach; it is
announced also as course 3 in education, and is accepted
toward the requirements of the teacher's certificate, and
counts as one of the five courses in education required for
graduation in this college.
4. EXPERIMENTAL PSYCHOLOGY ASSISTANT PROFESSOR MINER AND
MR. HAYNES
Three credits First semester
Open to juniors and seniors who have completed course 1. As
the number in each laboratory section will be limited, students
must arrange with their instructor as to their section before
registration.

5. EXPERIMENTAL PSYCHOLOGY—Higher Mental Processes

ASSISTANT PROFESSOR MINER

Three credits

Second semester

Open to juniors and seniors who have completed courses 1 and 4.

6. OUTLINES OF EXPERIMENTAL PSYCHOLOGY

ASSISTANT PROFESSOR MINER

Three credits

Second semester

Open to juniors and seniors who have completed course 1; not given in 1908-9.

All of the above courses have direct bearing upon the problems of education. The attention of future teachers is directed also to courses in ethics, the history of philosophy, the philosophy of religion, and other courses which are announced in the bulletin of the college of Science, Literature, and the Arts.

The following course in neurology, offered by the College of Medicine and Surgery, is of value to students who are taking advanced courses in psychology, and who are preparing to specialize in the teaching of education and psychology.

26. THE NERVOUS SYSTEM AND MENTAL LIFE

PROFESSOR JOHNSTON

Three credits

Second semester

Open to juniors and seniors.

ECONOMICS AND POLITICAL SCIENCE

ECONOMICS

1. ELEMENTS OF ECONOMICS

PROFESSOR ROBINSON AND DR. PHELAN

Three credits

First semester

Open to sophomores, juniors and seniors.

Designed for those who desire a general knowledge of economics, and as an introduction to the more advanced courses offered in the department.

A thorough course in the elements of economic theory, with special reference to present day economic and social problems; McVey's Outlines and a text book; supplemented by lectures and problems, with a weekly quiz.

2. ECONOMIC GEOGRAPHY

PROFESSOR ROBINSON

Three credits

First semester

Open to sophomores, juniors, and seniors.

A study of the economic basis of modern civilization. Text book, supplemented by lectures, reports on special topics, and quizzes.

3. MODERN INDUSTRIAL AND COMMERCIAL HISTORY

PROFESSOR GRAY

Six credits

Both semesters

Open to sophomores, juniors, and seniors.

This course may be taken in conjunction with course 1 or course 2. Both semesters must be completed before credit is given for the first semester.

The industrial and commercial history of western Europe and America since the middle of the eighteenth century; the effects of modern inventions and political changes on industry and trade. Lectures with prescribed topical reading; one written report of considerable length will be required each semester.

4. ADVANCED ECONOMICS

PROFESSOR ROBINSON

Three credits

Second semester

Open to those who have completed course 1; required for a major in economics and for a recommendation to teach commercial subjects.

An advanced course in general economics, devoted largely to a study of recent theories of distribution. Assigned readings, reports, and discussions.

5. **MONEY AND BANKING** **DR. PHELAN**
 Three credits First semester
 Open to those who have completed course 1.
 The history and theory of money, nature and uses of credit, functions of banks, foreign exchange. Lectures, text book, assigned readings, and discussions.

6. **PUBLIC FINANCE** **PROFESSOR ROBINSON**
 Three credits First semester
 Open to those who have completed course 1.
 The development of the state as an economic organism. Text book, supplemented by lectures and assigned readings.

7. **PROBLEMS OF TAXATION** **PROFESSOR ROBINSON**
 Three credits Second semester
 Open to those who have completed course 6.
 Study of tax systems, tax reforms, and special forms of taxation, based on Selligman, *Essays in Taxation*. Reports of state tax commissions, with lectures and reports on special topics.

POLITICAL SCIENCE

1. **ELEMENTS OF AMERICAN GOVERNMENT** **PROFESSOR SCHAPER AND**
MR. ALLIN
 Three credits First or second semester
 Open to sophomores, juniors, and seniors.
 An elementary course in American government, intended as a preparation for the advanced courses in political science, for teaching in secondary schools, and for good citizenship. Text, lectures, and special topics.

2. **COMPARATIVE GOVERNMENT** **MR. ALLIN**
 Three credits First semester
 Open to those who have completed course 1; a description and analysis of the government as the agent of the state. Texts, with lectures and assigned readings.

7. **MUNICIPAL ADMINISTRATION** **PROFESSOR SCHAPER**
 Three credits Second semester
 Open to those who have completed course 1.
 A comparative study of modern city charters and methods of administration. Text, lectures, and special topics.

8. **THEORY OF THE STATE** **PROFESSOR SCHAPER**
 Three credits Second semester
 Open to those who have completed courses 1 and 2.
 A study in the theory of the state, its origin, nature, purpose, and its justification. Text book, with lectures and topical readings.

13. **TEACHERS' COURSE IN GOVERNMENT** **PROFESSOR SCHAPER**
 One credit Second semester
 Open to students of suitable preparation who intend to teach American government in the secondary schools.
 Lectures and the examination of text books, maps, and other materials useful to teachers.

Students will not offer economics and political science as a major for graduation in this college, unless intending to teach commercial subjects.

except by special permission of the advisory committee, but all are recommended to take courses in these subjects. The attention of students who expect to teach history and American government is called to courses 2, 3, 5, and 28 in economics, and to courses 2, 3, 7, 9, and 15 in political science. All of these are open for election, on the approval of the head of the department, as well as the other courses announced in economics and political science.

HISTORY

INTRODUCTORY COURSES

1. EUROPEAN HISTORY FROM THE ESTABLISHMENT OF THE ROMAN EMPIRE TO THE REFORMATION, 31 B. C. TO 1500 A. D.
ASSISTANT PROFESSOR WESTERMANN
Six credits Both semesters
Open to all; juniors and seniors receive only half credit.
Especially designed for freshmen who have had less than two years of history in the secondary schools; not credited toward a minor in history.
2. ENGLISH CONSTITUTIONAL HISTORY TO THE ACCESSION OF GEORGE I.
PROFESSOR WHITE AND MISS JUDSON
Six credits Both semesters
Open to all who have had two years of history in the secondary schools, or who have completed course 1.

GENERAL COURSES

3. RENAISSANCE AND REFORMATION
PROFESSOR WHITE
Three credits First semester
Open to those who have completed course 1 or course 2.
The Renaissance and the Reformation will be studied as general European movements, with the emphasis upon the work of individual men and upon ideas rather than upon politics and institutions. The purpose of the course will be to show how the medieval world became the modern world.
4. EUROPE SINCE 1789
PROFESSOR ANDERSON
Six credits Both semesters
Open to those who have completed course 1 or course 2.
The history of France occupies the most prominent place in the course, that of other countries being grouped about it as far as possible.
5. AMERICAN CONSTITUTIONAL HISTORY TO 1840
PROFESSOR WEST
Six credits Both semesters
Open to those who have completed course 2.
Required for courses 6 to 9, inclusive, 11, 13, 14, and 19, and therefore recommended for the sophomore year to students who expect to specialize in history.
6. AMERICAN CONSTITUTIONAL HISTORY, 1841-1885
PROFESSOR WEST
Six credits Both semesters
Open to those who have completed course 2 and at least the first semester of course 5; given in 1908-9 and in alternate years thereafter.
15. HISTORICAL METHOD AND BIBLIOGRAPHY
PROFESSOR WHITE
Two credits Second semester
Open to those who have completed course 1 or course 2; designed only for those who intend to specialize in history.

16. **TEACHERS' COURSE** **PROFESSOR WEST**
 One credit **Second semester**
 Open to seniors and graduates who have, including courses in progress, twenty-four credits in history; required of those who obtain a teacher's recommendation in history.
 This course is designed to assist those who expect to teach history in the high schools. Mr. West will be aided by other members of the department.

20. **ENGLAND SINCE 1815** **PROFESSOR ANDERSON**
 Three credits **Second semester**
 Open to those who have completed course 2; may be taken to advantage in connection with course 4; not given in 1908-9.

21. **HISTORY OF GREECE** **PROFESSOR WESTERMANN**
 Three credits **First semester**
 Open to those who have completed course 1 or course 2.
 The course is general in its nature, and will cover the political and social development of the Greek states to the time of their incorporation in the Roman Empire, with particular emphasis upon the latter part of the period. Special attention will be given to the permanent influence of Greek civilization.

INTENSIVE COURSES

7. **THE MAKING OF THE CONSTITUTION** **PROFESSOR WEST**
 Six credits **Both semesters**
 Open to juniors, seniors, and graduates who have completed course 5, but only on the approval of the instructor; both semesters must be completed before credit is given for the first semester.
8. **AMERICAN HISTORY SINCE 1789, AS SHOWN IN THE DEVELOPMENT OF CONSTITUTIONAL LAW** **PROFESSOR WEST**
 Three credits **First semester**
 Open to seniors and graduate students who have completed courses 2, 5, 6, and 7; not given in 1908-9.
9. **STUDIES IN AMERICAN STATESMEN** **PROFESSOR ANDERSON**
 Three credits **Second semester**
 Open to juniors, seniors, and graduates who have completed course 2, and at least the first semester of course 5.
10. **A CRITICAL STUDY OF HISTORICAL MASTERPIECES** **PROFESSOR ANDERSON**
 Three credits **First semester**
 Open to those who have completed course 5.
11. **THE HISTORY OF AMERICAN DIPLOMACY** **PROFESSOR ANDERSON**
 Three credits **First semester**
 Open to seniors and graduates who have completed course 5.
12. **THE HISTORY OF EUROPEAN DIPLOMACY SINCE 1789** **PROFESSOR ANDERSON**
 Three credits **First semester**
 Open to seniors and graduates who have completed or are taking course 4; ability to read easy French is required.
13. **COLONIAL EXPANSION AND ADMINISTRATION** **PROFESSOR WEST**
 Three credits **Second semester**
 Open to seniors and graduates who have completed course 4 or course 5; given in alternate years; not offered in 1908-9.

14. **CRITICAL STUDY OF AUTHORITIES FOR EARLY NEW ENGLAND HISTORY** PROFESSOR WEST
Four credits Both semesters
Open to seniors and graduates who have completed eighteen credits, including course 5; both semesters must be completed before credit is given for the first semester; given in alternate years.
17. **MEDIEVAL ECONOMIC DOCUMENTS** PROFESSOR WHITE
Two credits Second semester
Open to seniors and graduates who have completed twelve credits in history.
18. **ORIGIN OF THE ENGLISH JUDICIAL SYSTEM** PROFESSOR WHITE
Three credits Second semester
Open to juniors, seniors, and graduates who have completed six credits in history, including course 2, and who obtain permission of the instructor. Students must be able to read medieval Latin.
19. **THE EXPANSION OF AMERICA, AS STUDIED IN ITS HIGHWAYS OF IMMIGRATION**
Six credits Both semesters
Open to seniors and graduates who have completed course 5; both semesters must be completed before credit is given for the first semester; not given in 1908-9.
22. **GREEK POLITICAL INSTITUTIONS** ASSISTANT PROFESSOR WESTERMANN
Three credits Second semester
Open to juniors, seniors, and graduates who have completed courses 1 or 2, 21, and six additional credits.
23. **ROMAN IMPERIAL ORGANIZATION** ASSISTANT PROFESSOR WESTERMANN
Three credits Second semester
Open to juniors, seniors, and graduates who have completed twelve credits.
Twenty-four credits, not counting course 1, six of which must be for intensive courses, and, in addition, course 16, are required of all who offer a major in history toward graduation in this college; eighteen credits are required for a minor. Students who expect to teach history are advised to consult in respect to their courses with the head of the department during the freshman year.

SOCIOLOGY

1. **DESCRIPTIVE SOCIOLOGY** PROFESSOR JENKS
Three credits First semester
Open to juniors and seniors.
2. **ELEMENTS OF SOCIOLOGY** MR. REEP
Three credits First or second semester
Open to juniors and seniors.
3. **SOCIAL PATHOLOGY** PROFESSOR SMITH
Three credits First semester
Open to juniors and seniors.
4. **SOCIAL THEORY** MR. REEP
Three credits First semester
Open to those who have completed course 1 or course 2.

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| 5. | SOCIAL GROUPS
Three credits
Open to those who have completed course 1. | PROFESSOR SMITH
First semester |
| 6. | THE STUDY OF INSTITUTIONS
Three credits
Open to those who have completed course 1. | PROFESSOR SMITH
First semester |
| 7. | ANTHROPOLOGY
Three credits
Open to juniors and seniors. | PROFESSOR JENKS
First semester |
| 8. | ETHNOLOGY
Three credits
Open to juniors and seniors who have completed course 1, 2, or 7,
and to graduate students. | PROFESSOR JENKS
Second semester |
| 9. | THE PHILLIPPINE PEOPLE
Three credits
Open to juniors, seniors, and graduate students. | PROFESSOR JENKS
Second semester |
| 10. | PHYSICAL ANTHROPOLOGY
Three credits
Open to juniors and seniors who have completed course 7 or
course 8, and to graduate students. | PROFESSOR JENKS
Second semester |
| 11. | THE AMERICAN NEGRO RACE
Three credits
Open to juniors, seniors, and graduate students; not given in
1908-9. | PROFESSOR JENKS
Second semester |
| 12. | THE AMERICAN PEOPLE
Three credits
Open to juniors, seniors, and graduate students. | PROFESSOR JENKS
First semester |
| 13. | BIBLICAL SOCIOLOGY
Three credits
Open to juniors, seniors, and graduate students. | PROFESSOR SMITH
First semester |
| 14. | MODERN SOCIAL INSTITUTIONS
Three credits
Open to those who have completed course 7. | MR. REEF
First semester |

DRAWING

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| 1. | ELEMENTARY DRAWING
Three credits
Open to juniors and seniors.
The course includes drawing from objects, from plants, from
landscape, and from figure poses, in pencil and in water color;
the study of perspective; work from cast in charcoal; brush
drawing. | MISS CLOPATH
First semester |
| 2. | ADVANCED DRAWING
Three credits
Open to juniors and seniors who have completed course 1.
More advanced work from objects and from cast; work in water
color and in colored chalks; pen and ink drawing; simple
exercises in lettering and composition. | MISS CLOPATH
Second semester |

3. **DESIGN** MISS CLOPATH
Six credits Both semesters
Open to seniors who have completed courses 1 and 2.
Exercises in composition, illustrating the various principles of decorative work, adaptation of plant forms, stencils, illuminated lettering; designs applied to simple forms of handicraft. Lectures on the fundamental principles of design, illustrated by art masterpieces.
4. **HISTORICAL DESIGN** MISS CLOPATH
Six credits Both semesters
Open to juniors and seniors who have completed course 1.
Original designs in different styles applied to articles of household use; color harmony; simple forms of pottery with applied designs. Lectures and collateral reading.
5. **DRAWING AS RELATED TO EDUCATION** MISS CLOPATH
Three credits First semester
Open to juniors and seniors who have completed courses 1 and 2.
Exercises in all the different kinds of art work used in the schools; advanced work in black and white, and in color.
6. **THE TEACHING OF DRAWING** MISS CLOPATH
One credit Second semester
Open to seniors who have completed course 3.
This course is conducted by lectures and collateral reading on the methods and value of drawing, as revealed through a study of the instincts and mental processes of the child.

MUSIC

1. **HARMONY** ASSISTANT PROFESSOR SCOTT
Four credits Both semesters
Open to juniors and seniors; the fee is four dollars per semester.
2. **COUNTERPOINT** ASSISTANT PROFESSOR SCOTT
Four credits Both semesters
Open to juniors and seniors who have a thorough knowledge of harmony; the fee is four dollars per semester.
3. **MUSICAL FORM AND FREE COMPOSITION** ASSISTANT PROFESSOR SCOTT
Two credits Second semester
Open to seniors who have completed course 1 and the first semester of course 2.
Intended for those specializing in music, and can be taken only with the consent of the instructor; the fee is four dollars per semester.
4. **PIANOFORTE** PROFESSOR OBERHOFFER AND ASSISTANT PROFESSOR SCOTT
Three or six credits Both semesters
Open to juniors and seniors.
Intended for those who propose to pursue the higher branches of pianoforte playing, or to fit themselves for piano teaching. Other arrangements may be ascertained upon application.
5. **CHORAL CULTURE** PROFESSOR OBERHOFFER
Four credits Both semesters
Open to juniors and seniors.
A single credit may be secured for chorus work, provided that students pursuing work for credit take course 1 or 2 at the

same time; students may pursue chorus work without credit by paying the required fee and securing the consent of the director.

6. **HISTORY OF MUSIC** ASSISTANT PROFESSOR SCOTT
 Two credits Both semesters
 Open to juniors and seniors; the fee is four dollars per semester.

7. **TEACHERS' COURSE (Elementary)** ASSISTANT PROFESSOR SCOTT
 Two credits Both semesters

This is an elementary course open to all students possessing a fair voice and a good ear and is given as a partial preparation for teaching music in the public schools. It includes the fundamentals of music and will aid students in their preparation to teach music in the advanced grammar grades and in the high schools. Especial attention will be given to chorus direction. One hour each week is given to this work and the course is planned to continue through three semesters, two in elementary music and the third a semester of harmony such as is announced in course 1. The fee for this work will be four dollars for each semester; three credits for the complete course.

AGRICULTURE

1. **ELEMENTS OF AGRICULTURE** MR. MAYNE
 Three credits First semester

Open to juniors and seniors, with credit toward the degree of bachelor of science (in education).

This course is planned to meet the increasing demand for a knowledge of the elements, at least, of agriculture on the part of graded school principals, rural school teachers, county superintendents of schools and others concerned with education in the agricultural sections of the state. The course is given at the School of Agriculture, on Tuesday and Saturday afternoons.

2. **ELEMENTS OF AGRICULTURE (Continued)** MR. MAYNE AND ASSISTANTS
 Three credits Second semester

Open to juniors and seniors, with credit toward the degree of bachelor of science (in education).

This is a continuation of course 1 and is planned to give the student some familiarity with the underlying principles and the simple processes connected with various forms of agricultural work. Tuesday and Saturday afternoons. Mr. Mayne will have the co-operation of others connected with this branch of the University. Students who are interested are advised to read the bulletin of the School of Agriculture and to note the various opportunities which are there afforded, for all of these will be made available to some extent in connection with these courses.

DOMESTIC ART AND DOMESTIC SCIENCE

These courses cover specifically the science and the art of the home. In the reactionary movement, away from the theoretical, and toward the practical in education, the need of teachers of scientific and artistic home-making has become marked. To meet this demand the following courses have been organized:

DOMESTIC ART

Domestic art has to do with the very beginning of home-making, the selection of a site, the adaptation of architecture to the needs of the family, the

choice of materials, colors, etc., and their relation to the surroundings, the interior of the home, its furniture and keeping. All of these topics are viewed in both their economic and their social aspect. In addition a full course is offered in needle-work in all its branches.

1. A STUDY IN TEXTILES

MRS. BLAIR

Three credits

First semester

Open primarily to those who expect to teach this subject, with credit toward the degree of bachelor of science (in education).

Animal and vegetable fibres, weaves and dyes, testing fabrics for household use and personal wear, the hygiene values of various fabrics, harmony of color. This course is designed especially to assist the teaching of sewing in graded schools, and includes the preparation, explanation and making of models suited to grade work in the public schools. This course will be given upon Monday and Thursday afternoons, at the School of Agriculture.

2. DESIGN AND GARMENT DRAFTING

MRS. BLAIR

Three credits

Second semester

Open to those who have completed course 1, with credit toward the degree of bachelor of science (in education).

This course is in the design and drafting of children's and adults' garments and includes also a series of lectures upon the home.

This course will be given Monday and Thursday afternoons at the School of Agriculture.

DOMESTIC SCIENCE

Domestic science has to do with the chemistry of the table, the science of cooking, and the housewifely care of the kitchen and dining-room; household accounts, and the administration of the home upon an economical basis, are discussed in their various relations in these courses and the effort is toward system, economy and effectiveness in home management. Students who look forward to teaching are trained to assist in the teaching or supervision of this work in city schools or to have the entire charge of the work, in connection with other teaching, in the smaller high schools.

1. LAUNDERING AND FOOD ECONOMICS

MISS SHEPPERD

Three credits

First semester

Open primarily to those who expect to teach this subject, with credit toward the degree of bachelor of science (in education).

In this course the subject of domestic and commercial laundering and cleaning is first considered, with a study of removing stains, dyeing, setting colors, cleaning delicate fabrics, the use of cleaning agents, starches and bluing. By far the larger part of the semester is given to a study of food economics, with a consideration of all phases of the selection of food materials and the preparation of food. The course is conducted by means of lectures, readings, with the writing of a thesis and by full individual practical experience in all parts of the work.

The course is given on Wednesday and Friday afternoons at the School of Agriculture.

2. MANAGEMENT OF KITCHEN AND DINING ROOM

MISS SHEPPERD

Three credits

Second semester

Open to those who have completed course 1 with credit toward the degree of bachelor of science (in education).

(a) The kitchen equipment, sanitation, labor saving devices, etc.

(b) The dining room, equipment, furniture, decorations, management, etc.

(c) Household inventories, bills of fare, fancy cookery, etc.

The above course is made, as far as possible, both practical and

scientific. It requires three hours of work on each of two afternoons. Students who are interested in this line are advised to read a fuller description, which will be found in the Bulletin of the School of Agriculture.

MANUAL TRAINING

1. **INTRODUCTORY COURSE IN WOODWORK** **MR. RICHARDS**
Three credits **First semester**
Open to juniors or seniors.
Planned to give the elementary principles of sloyd and familiarity with material and tools.
2. **ADVANCED COURSE IN WOODWORK** **MR. RICHARDS**
Three credits **Second semester**
Open to juniors and seniors.
Each credit hour calls in all manual training courses for at least three hours of shopwork.
3. **INTRODUCTORY COURSE IN IRON WORK** **MR. SHIPLEY**
Three credits **First semester**
Open to juniors and seniors.
4. **ADVANCED COURSE IN IRON WORK** **MR. SHIPLEY**
Three credits **Second semester**
Open to juniors and seniors.
Students may register for credit in manual training courses only with the approval of the committee.

GRADUATE SCHOOL

The Graduate School

FACULTY

- CYRUS NORTHROP, LL.D., *President* 519 Tenth Avenue S. E.
HENRY T. EDDY, C. E., Ph. D., LL. D. 916 Sixth Street, S. E.
*Dean of the Graduate School, and Professor of Mathematics
and Mechanics, College of Engineering and the Mechanic Arts.*
CEPHAS D. ALLIN, M. A., LL. B., Minneapolis
Instructor in Political Science.
FRANK MALOY ANDERSON, M.A., 1629 University Avenue, S. E.
Professor of History.
CHARLES W. BENTON, M.A., Litt.D., 516 Ninth Avenue S. E.
Professor of the French Language and Literature.
ANDREW BOSS, St. Anthony Park
Professor of Agriculture and Animal Husbandry.
GISLE BOTHNE, M. A., 934 Fifteenth Avenue S. E.
Associate Professor of Scandinavian Languages and Literature.
JABEZ BROOKS, D.D., 1708 Laurel Avenue
Senior Professor of the Greek Language and Literature.
RICHARD BURTON, Ph.D., Hampton Apartments
Professor of English Literature.
JOHN S. CLARK, B.A., 729 Tenth Avenue S. E.
Professor of the Latin Language and Literature.
F. R. CLEMENTS, Ph.D., Minneapolis
Professor of Botany.
FRANK H. CONSTANT, C.E., 1803 University Avenue S. E.
Professor of Structural Engineering.
JOHN L. COULTER, M. A., Minneapolis
Instructor in Economics.
SAMUEL N. DEINARD, M.A., Minneapolis
Assistant Professor of the Semitic Languages and Literatures.
JOHN F. DOWNEY, M.A., C.E., 825 Fifth Street S. E.
*Dean of the College of Science, Literature and the Arts,
and Professor of Mathematics.*
HENRY A. ERICKSON, Ph. D., Minneapolis
Assistant Professor of Physics.
OSCAR W. FIRKINS, M. A., 1528 4th Street S. E.
Instructor in Rhetoric.

- JOHN J. FLATHER, Ph.B., M.M.E., 1103 Fourth Street S. E.
Professor of Mechanical Engineering.
- GEORGE B. FRANKFORTER, M.A., Ph.D., 525 River Road, S. E.
Dean of the School of Chemistry, and Professor of Chemistry.
- EDWARD M. FREEMAN, M. S., Ph. D., St. Anthony Park
Assistant Professor of Botany.
- JOHN E. GRANRUD, Ph.D., 605 Delaware Street S. E.
Assistant Professor of Latin.
- J. H. GRAY, Ph.D., 412 Walnut Street, S. E.
Professor of Economics and Politics.
- SAMUEL B. GREEN, B.S., St. Anthony Park
*Professor of Horticulture and Forestry, and Horticulturist
of the Experiment Station.*
- T. L. HAECKER, St. Anthony Park
Professor of Dairy Husbandry.
- CHRISTOPHER W. HALL, M.A., 803 University Avenue S. E.
*Professor of Geology and Mineralogy; Curator of the
Geological Museum.*
- ARTHUR EDWIN HAYNES, M.S., M.Ph., Sc.D., 703 River Parkway
Professor of Engineering Mathematics.
- JOHN C. HUTCHINSON, B.A., 3806 Blaisdell Avenue
Professor of the Greek Language and Literature.
- GEORGE FRANCIS JAMES, Ph.D., 308 Eighteenth Avenue, S. E.
Dean of the College of Education, and Professor of Education.
- ALBERT ERNEST JENKS, Ph. D., 313 Sixteenth Avenue S. E.
Professor of Anthropology.
- JOHN BLACK JOHNSTON, Ph. D., 509 St. Anthony Parkway
Assistant Professor of the Anatomy of the Nervous System.
- FREDERICK S. JONES, M.A., 712 Tenth Avenue S. E.
*Dean of the College of Engineering and the Mechanic Arts,
and Professor of Physics.*
- WILLIAM H. KAVANAUGH, M.E., 503 Fifteenth Avenue S. E.
Professor of Experimental Engineering.
- WILLIAM H. KIRCHNER, B.S., 217 Beacon Street
Professor of Drawing and Descriptive Geometry.
- FREDERICK KLAEBER, Ph.D., 616 Ninth Avenue S. E.
Professor of Comparative and English Philology.
- FRANCIS P. LEAVENWORTH, M.A., 1628 Fourth Street S. E.
Professor of Astronomy and Director of the Observatory.
- THOMAS G. LEE, B.S., M.D., 509 River Road
Professor of Histology and Embryology.
- JAMES BURT MINER, Ph.D., 1319 Fifth Street S. E.
Assistant Professor of Psychology.

- JOHN G. MOORE, B.A., 2810 University Avenue S. E.
Professor of the German Language and Literature.
- W. S. NICKERSON, Sc. D., M. D., 217 Beacon Street S. E.
Assistant Professor of Histology and Embryology.
- HENRY F. NACHTRIEB, B.S., 905 Sixth Street S. E.
*Professor of Animal Biology; Zoologist of the Geological
 and Natural History Survey; Curator of the Zoological
 Museum.*
- OSCAR W. OESTLUND, M.A., 1910 Fourth Street S. E.
Assistant Professor of Animal Biology.
- WILLIAM S. PATTEE, LL.D., 1319 Fifth Street S. E.
*Dean of the College of Law, and Professor of Equity and In-
 ternational Law.*
- MARY GRAY PECK, M.A., 2412 Harriet Avenue
Assistant Professor of English.
- RAYMOND V. PHELAN, Ph. D., 1629 University Avenue, S. E.
Instructor in Economics.
- JOSEPH BROWN PIKE, M.A., 525 Tenth Avenue S. E.
Professor of Latin.
- FRANCES S. POTTER, M.A., 2412 Harriet Avenue
Professor of English.
- BENJAMIN M. ROSTALL, Ph. D., Minneapolis
Assistant Professor of Economics.
- ALBERT W. RANKIN, A.B., 916 Fifth Street S. E.
Associate Professor of Education.
- M. H. REYNOLDS, M.D., V.M., St. Anthony Park
*Professor of Veterinary Medicine and Surgery and
 Veterinarian of the Experiment Station.*
- E. V. ROBINSON, Ph.D., 1213 Seventh Street, S. E.
Professor of Economics and Politics.
- C. O. ROSENDAHL, Ph.D., 626 Sixteenth Avenue S. E.
Assistant Professor of Botany.
- FREDERICK W. SARDESON, Ph.D., 414 Harvard Street
Assistant Professor of Paleontology.
- CHARLES ALBERT SAVAGE, Ph.D., 1100 Fifth Street, S. E.
Assistant Professor of Greek.
- WILLIAM A. SCHAPER, Ph.D., 1009 University Avenue S. E.
Professor of Political Science.
- CARL SCHLENKER, B.A., 422 Union Street, S. E.
Professor of German.
- GEORGE D. SHEPARDSON, A.M., M.E., Minneapolis

- CHARLES F. SIDENER, B.S., 1320 Fifth Street S. E.
Professor of Chemistry.
- CHARLES P. SIGERFOOS, Ph.D., 1206 Fifth Street S. E.
Professor of Zoology.
- SAMUEL G. SMITH, Ph.D., LL.D., St. Paul
Professor of Sociology.
- HARRY SNYDER, B.S., St. Anthony Park
*Professor of Agricultural Chemistry, and Chemist of the
 Experiment Station.*
- FRANK W. SPRINGER, E.E., 1100 Fifth Street S. E.
Assistant Professor of Electrical Engineering.
- ANDREW ADIN STOMBERG, M. A., 709 Delaware Street, S. E.
Professor of Scandinavian Languages and Literature.
- DAVID F. SWENSON, B.S., 3101 Sixteenth Avenue S.
Assistant Professor of Philosophy.
- JOSEPHINE E. TILDEN, M.S., 800 Fourth Street, S. E.
Assistant Professor of Botany.
- FREDERICK L. WASHBURN, M.A., St. Anthony Park
*Professor of Entomology, and Entomologist of the Experiment
 Station; State Entomologist.*
- WILLIS M. WEST, M.A., 1314 Sixth Street S. E.
Professor of History.
- FRANK F. WESBROOK, M.A., M.D., C.M., 328 Tenth Avenue S. E.
*Dean of the College of Medicine and Surgery; Professor of
 Pathology and Bacteriology.*
- ALBERT B. WHITE, Ph.D., 515 Fifteenth Avenue S. E.
Professor of History.
- NORMAN WILDE, Ph.D., 910 Sixth Street S. E.
Professor of Philosophy and Psychology.
- FREDERICK J. WULLING, Ph.G., Phar.D., LL.M., 3305 Second Avenue S.
*Dean and Professor of Pharmacology, Pharmaceutical Chemistry,
 and Pharmacal Jurisprudence, College of Pharmacy.*
- ANTHONY ZELENY, Ph. D., 321 Church Street, S. E.
Assistant Professor of Physics.
- JOHN ZELENY, Ph.D., Minneapolis
Professor of Physics.

The Graduate School

The graduate school has been established by the Board of Regents to include in a single organization the graduate work of all colleges and schools of the University, which offer courses of instruction leading to the higher degrees. The administration of the school is entrusted to the Dean, who is charged with its supervision and regulation, under the general direction of the President.

The faculty of the school consists of all those professors in the University who give courses of instruction accepted for such higher degrees as are offered by the school. Each college of the University has its graduate committee.

The Dean is chairman of the faculty and of the graduate committees of the various colleges, *ex officio*.

Regular faculty meetings will be held on the second Friday of each semester and on the last Friday of the year, and they may also be called by the Dean at such other times as business may demand.

The aim of the school is to offer instruction and opportunity for study combined with facilities for investigation and research to graduate students who desire to pursue some one or more branches of knowledge beyond the ordinary undergraduate courses.

FEES

All students taking full work in this school are required to pay a fee of ten dollars a semester, or a proportionate fee for less work. Members of the staff of instruction in the University may register for graduate work without payment of tuition fees. Laboratory fees are charged in addition to those just mentioned.

ADMISSION

Any graduate from a four years' course of study in any reputable college or university will be admitted to the graduate school without examination, but will not be thereby admitted to candidacy for either of the higher degrees until his case has been duly considered and approved, as is explained later, in connection with the several degrees.

Each applicant for admission to the school should present himself in person to the Registrar with his credentials (preferably his diploma of graduation), in order to register and pay his fees.

In case of doubt respecting the same.
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Registration at the beginning of each semester is obligatory upon graduate students and undergraduates alike.

Each student will receive at registration for entrance to the school a registration book in which to inscribe the courses he desires to pursue. When the instructors in charge of these courses shall have signed this book certifying that the student is prepared to begin such courses and when the Dean shall have approved this choice, the Registrar will issue cards authorizing the student to attend the courses thus certified to. Upon the successful completion of such work the instructors shall again sign the registration book. The student shall retain his book until ready for final examination, when he shall present it to the chairman of the examining committee. The action of the committee shall be recorded thereon and the book be deposited with the Registrar for record.

DEGREES

The degree of Master of Arts is, in general, conferred for advanced non-technical study; the degree of Master of Science for advanced technical study, such as agriculture, industrial chemistry, engineering, etc.; and Master of Laws for advanced legal studies.

The Master's Degree. Three degrees of this grade are conferred, viz.: Master of Arts (M.A.), Master of Science (M.S.), and Master of Laws (LL.M.).

Candidacy for the Master's Degree. Any bachelor, a graduate of this University or of any other university or college with an equivalent baccalaureate course, will be enrolled by the Dean as a candidate for the corresponding master's degree on the basis of an approved course of study conforming to requirements detailed below, provided the heads of the departments in which the studies selected lie, signify their approval of the student's preparation to enter upon the work selected.

In case of inadequate preparation for the work selected, such preliminary study as the case may require will be stated by the professor in charge and will be insisted on before the applicant is admitted to candidacy.

Regulations. The master's degree will be conferred on any candidate enrolled for that degree, who not sooner than one year after graduation if in residence at the University, and not sooner than two years after registration if not in residence, shall pass satisfactory final examinations on the subjects in which he was admitted to candidacy, and shall

The professor with whom the candidate pursues his major subject shall be chairman of a committee of three, having in charge the work of the candidate from the time of his enrollment as such, the other members of the committee being those professors under whom the candidate's minors fall. This committee shall arrange for and have charge of the final examinations of the candidate; they shall approve the subject of the thesis, and pass upon the thesis itself. The candidate must secure their approval of his subject at least three months before graduation, and must complete the thesis and all examinations at least two weeks before graduation. All candidates for the master's degree shall pass written examinations upon all work taken by them, time and place to be determined by the committee. If these examinations and the thesis are satisfactory, the candidate shall be admitted to a final oral examination before the committee. It shall be the duty of this committee to canvass the examinations of the candidate's whole course together with the thesis, and in case they regard him entitled to a degree, to report the fact to the Dean, at least one week before commencement. The chairman of the committee shall also make a final report upon the candidate to the Registrar one week before commencement.

Any candidate for master's degree at commencement must, as a preliminary, make application to the Dean in writing, by the first of the preceding May, and state the courses in which he has passed and is to pass examination, the title of his thesis, and the names of the committee in charge of his work.

The amount of work required for the master's degree shall be equivalent to that done by the senior class. Proficiency shall be determined by examination upon the subject matter of the courses taken and of the thesis.

For convenience in selecting among the various departments and subjects of study they are arranged in groups, as follows:

1. Education, Philosophy, Psychology, Sociology.
2. Economics, History, Law, Political Science.
3. Greek, Latin, Sanscrit, and Semitic languages and literatures.
4. Comparative Philology, English, Germanic, Romance, and Scandinavian languages and literatures.
5. Anatomy, Animal Biology, Bacteriology, Botany, Embryology, Histology, Paleontology, Physiology.
6. Agriculture, Chemistry, Geology, Mineralogy.
7. Astronomy, Engineering, Mathematics, Mechanics, Physics.

Candidates desiring a master's degree in some special line of study, for the purpose of teaching or research, or as a basis for studies leading to the doctor's degree, must select three subjects of study, a major to occupy at least one-half of the work required, a first minor to occupy one fourth, which shall be germane to the major subject by being selected from the same group or a closely related group, and a second minor to

complete the work required, which last shall be in some reasonable connection with the other subjects selected. In special cases the candidate may be allowed to fill the required time with a major and one minor only. The thesis in this case must embody the results of study and investigation along the line of the major subject. In attaining this specialized master's degree, the thesis is regarded of much importance, and to it the candidate should devote much time and effort. To render this possible, the professor in charge of the major subject may count work assigned in its preparation as part of the time required in that subject.

Candidates desiring a master's degree with a view to general culture will select subjects from three distinct groups, of which the work in no one group shall be less than four hours a week, for the year. The work in one of these groups shall be designated as the candidate's major and to it the subject of his thesis shall stand in close relation. The courses pursued in the major shall be in advance of any regularly pursued by undergraduates.

All theses must be written in satisfactory English and those accepted for the degree of M. S. and M. A. shall be filed with the librarian of the University for cataloguing before distribution to departmental libraries.

Theses for all degrees in the graduate school shall be typewritten on one side only of the sheet, on paper of good linen stock measuring eight and one-half by eleven inches, and shall have a margin of one and one-quarter inches on all sides of the text. The title page of the thesis should be in the following form: (Title of the thesis). "A thesis submitted to the faculty of the Graduate School of the University of Minnesota by (name in full) in partial fulfillment of the requirements for the degree of (name of the degree in full), (date)."

A candidate for the degree of Master of Laws must not only be Bachelor of Laws from a reputable law college having a course equivalent in length to that at the University of Minnesota, but he must in addition have been admitted to the bar in Minnesota. Any person who possesses the requisite legal learning may on registration pursue any or all of the studies offered for this degree, but he thereby acquires no standing as candidate for this degree.

The major selected for this degree will in all cases be Law, and the minors, Political Science and Constitutional History.

The Doctor's Degree. Three degrees of this grade are conferred, viz.: Doctor of Philosophy (Ph. D.), Doctor of Science (Sc. D.), and Doctor of Civil Law (D. C. L.), for still more advanced study than that leading to the corresponding bachelor's and master's degrees, and such special attainments therein as show power of original investigation and independent research, together with a fair degree of literary skill as evinced by the preparation of a thesis which shall be a contribution to knowledge.

Candidacy for the Degree of Doctor. Any student in the Graduate School who applies to be enrolled as candidate for a doctor's degree must, in order to be enrolled as such, possess a reading knowledge of French and German, certified to by the professors respectively in charge of those languages, and in case of an applicant applying to be enrolled as candidate for the degree of Doctor of Civil Law, proficiency in Latin and Roman History is also required. Knowledge of Latin will also be required in certain other cases such as for a major in Medieval History, or Philosophy, as the professor in charge may prescribe.

The applicant must also have made before enrollment such noteworthy advancement in his graduate work as to secure the approval of his candidacy by his instructors. And in particular, he must obtain the written consent of the professor under whom his major subject falls to take charge of his instruction in that subject. His minors must also be acceptable to this professor, who must recommend him to the dean as a suitable candidate for the degree sought.

In order for the applicant to be successful, this professor should also state that, through the work thus far accomplished by the applicant, he has become convinced of his capacity and of his probable ability to carry an investigation in his special field to a successful conclusion and embody it in a valuable thesis.

The Dean shall, after full consideration and consultation with the professor concerned, pass upon his application and have power to enroll the applicant as candidate or refuse to do so. Such enrollment as candidate must be secured at least one year before the degree will be conferred.

It will frequently not be practicable to enroll an applicant as candidate for the doctor's degree before the completion of one year's study in the Graduate School. Graduates desiring to become candidates for this degree will find it advisable, under ordinary circumstances, to spend the first year of graduate study in attaining to the specialized master's degree, as part of the work leading to the doctor's degree.

That procedure is likely to furnish such a decisive test of capacity for advanced study, as well as experience in preparation of a thesis, as to settle definitely the question of candidacy for the doctor's degree.

Candidates for the degree of Doctor of Civil Law are required to secure the degree of Master of Laws as a preliminary.

Regulations. Candidates for the degree of doctor must devote at least three years of graduate study to the subjects approved for candidacy, of which the last year must be spent in residence at the University of Minnesota. In lieu of the other years the candidate may offer an equivalent term of graduate study at some other university, but study pursued and work done *in absentia* without proper facilities of libraries and laboratories will not be accepted.

in which case the candidate will be held responsible for following the directions indicated, in the form of written examination.

The candidate must pass satisfactory written examinations on the major and minor subjects at any time not more than one year before the final examination on the major.

In the case of the minors this written examination shall be held if these examinations are satisfactory and the candidate shall be admitted to a final oral examination upon the major.

The final examination upon the major must include a knowledge of the special subject selected, and a knowledge of the general field in which the subject lies, but the candidate shall be admitted to the final examination upon his major subject if recommended by the committee in charge and found satisfactory.

The order of procedure to be followed is that the candidate for a doctor's degree shall submit the title and outline of his thesis to the professor in charge of his major for final approval before the first of October preceding the commencement at which the degree will be conferred. In case the proposed subject and the candidate shall make a statement in writing before the first of the following February, of his intention to receive a doctor's degree at the next commencement, giving the names of the committee in charge of his work, the subjects of his major and minors, and the title of his thesis.

The thesis itself shall be completed in the time prescribed, and delivered to the professor in charge of his major before commencement. In case the thesis is found satisfactory the candidate will be admitted by the committee to the final examination on the major and upon the subject matter of his thesis.

This examination shall be arranged for by the professor in charge of the major, on a date at least two weeks before commencement, and shall be held by a committee of examination of which the professor in charge of the major shall be a member.

the Dean may appoint as members of this examining committee. In order to do this, the Dean shall be duly informed of the date of the examination by the chairman.

The examining committee shall decide from all the facts within its knowledge, whether the candidate is, in its estimation, entitled to receive the doctor's degree sought, and the chairman shall, without delay, report its findings, in writing, to the Dean and to the Registrar.

Immediately after the final examination, the thesis shall be placed by the chairman in the president's office for general examination, and finally deposited with the librarian.

In case the report of the committee is favorable, the candidate shall be presented to the faculty of the graduate school, at a meeting called for the purpose, by the professor in charge of his major subject, who shall then make a written statement of the academic life of the candidate, of the character and scope of his examinations, and the scope and value of his thesis.

Any member of the faculty shall then be at liberty to propound any questions he will to the instructors of the candidate, respecting his work, or to the candidate himself, respecting the subject matter of his thesis. Upon evidence before it, the faculty shall then decide by vote whether the candidate shall be recommended for the degree.

Courses of Instruction

The Arabic numerals by which the courses are here designated are those under which they appear in the bulletins of the separate colleges.

The courses which are offered to both undergraduates and graduates may not be selected by graduates as major subjects, but as minors only. The courses offered primarily for graduates include the subjects offered to them as majors.

AGRICULTURE

PLANT BREEDING—FIELD CROPS

ASSISTANT PROFESSOR BULL

Courses in this subject will include research along such lines as may be advisable, in view of the previous training of the student, the available material and facilities for instruction, and the object sought by the candidate.

The prominent features of the course will be a study of history and methods; laws of evolution, heredity, etc.; probabilities, hybridization, selection; nursery and plant manipulation; character plotting; plant economics.

Open to candidates for advanced degrees who have completed a long course in botany and agriculture 1 or their equivalent.

FARM MANAGEMENT

MR. WILSON

Reading and research work combined with occasional lectures.

Those who wish may choose any subject or problem of farm management that is of personal interest, provided they can get the necessary material for study. Any problem related to farming may be chosen, and must be presented from a practical business standpoint with special reference to profit and loss on the farm. Open as major subject to candidates for advanced degree.

ANIMAL HUSBANDRY

ANIMAL FEEDING AND NUTRITION

PROFESSOR BOSS

Original investigations in animal feeding with studies of food requirements for maintenance and growth. Problems will be arranged to suit the training and needs of the individual student.

MEATS—STRUCTURE—COMPOSITION AND PREPARATION FOR USE

PROFESSOR BOSS AND ASSISTANT PROFESSOR GAUMNITZ

A course in which special consideration is given to the structure and composition of meats and to processes of ripening and curing them for food purposes. Original investigations will be required and equipment and material furnished for extensive study in this line.

ANIMAL BIOLOGY

Graduates, whether candidates for a degree or not, will be admitted to any line of research or advanced work that can be carried on profitably.

Less advanced graduates will be admitted to any regular classes of the department for which they are sufficiently prepared.

All advanced students are expected to take an active part in the Journal Club and the Biological Club.

Students who contemplate taking advanced work are advised to confer with the head of the department.

10. **HISTORY OF ZOOLOGY** PROFESSOR NACHTRIEB
Two credits (two hours per week) First semester
Open to juniors and seniors; students are advised to complete course 1 before electing this course; not offered in 1908-9.

A course of lectures on the history of zoology from ancient times to the present, including a brief history of our domestic animals and those that have become extinct within historic times, and a discussion of the modern theories and problems of heredity and evolution.

11. **ANIMAL HABITS AND INTELLIGENCE** PROFESSOR NACHTRIEB
Two credits (two hours per week) Second semester
Open to juniors and seniors; students are advised to complete course 1 before electing this course; alternates with course twelve.

The course consists of lectures and discussions on animal habits and intelligence, and concludes with a consideration of the development of mental power in animals.

12. **ECONOMIC ZOOLOGY** PROFESSOR NACHTRIEB
Two credits (two hours per week) Second semester
Open to juniors and seniors; alternates with course 11; not given in 1908-9.

Lectures on the uses made of animals and their products, the production and protection of those animals of special economic importance, and the methods of protection against some of the disease-producing animals.

13. **TEACHERS' COURSE** PROFESSOR NACHTRIEB AND ASSISTANTS
One credit (one hour per week) First semester
Open to those who have completed a minor in zoology; given in alternate years.

Lectures and discussions on the ends to be attained through courses in general zoology and the methods and means by which such ends may be gained.

FOR GRADUATES

14. **PROBLEMS AND RESEARCH** PROFESSOR NACHTRIEB AND ASSISTANTS
Six or twelve credits (six or twelve hours per week) Both semesters
Open to those who have completed courses 1 and 3 or 1 and such other work as may be required by the instructor in charge; both semesters must be completed before credit is given for the first semester.

The course consists of advanced or essentially independent work carried on in some specific line under the direction of the professor in charge of that work. The lines of work open at present are:

- (a) Morphology of vertebrates under Assistant Professor Brown
- (b) Blood, connective tissue and excretory organs of vertebrates under Assistant Professor Downey
- (c) Entomology under Assistant Professor Oestlund
- (d) Experimental zoology
- (e) General physiology under Professor Nachtrieb
- (f) Invertebrate embryology under Professor Sigerfoos
- (g) Invertebrate morphology under Professor Sigerfoos
- (h) Vertebrate embryology or morphology under Professor Nachtrieb.

ASTRONOMY

FOR UNDERGRADUATES AND GRADUATES

2. **PRACTICAL ASTRONOMY** PROFESSOR LEAVENWORTH
Six or twelve credits (three or six hours per week) Both semesters
Open to juniors and seniors who have completed course 1 and mathematics 5, 6, and 7.

Theory and use of astronomical instruments in determining time, latitude, longitude, positions of heavenly bodies; astronomical photography, with measures of plates; study of the method of least squares.

FOR GRADUATES

3. **ADVANCED PRACTICAL ASTRONOMY** PROFESSOR LEAVENWORTH
Six credits (three hours per week) Both semesters
Open to graduate students who have completed courses 1 and 2.

4. **CELESTIAL MECHANICS** PROFESSOR LEAVENWORTH
Six credits (three hours per week) Both semesters
Open to graduate students who have completed courses 1 and 2.

5. **ASTROPHOTOGRAPHY** PROFESSOR LEAVENWORTH
Both semesters

Open to graduate students who have completed courses 1 and 2.

Photography of the heavenly bodies, measurement of plates, determination of positions, parallax, etc.

BOTANY

Students entering the department for the first time must take course 1, or present a satisfactory equivalent. Courses 1 and 2 are required for entrance to all advanced courses, with the exception of eleven to fifteen. Students are requested to confer with the head of the department before electing an advanced course.

The Botanical Seminar consists of advanced students in botany, together with the staff of the department. It meets every two weeks for the presentation of the results of investigation, and for the discussion of current problems.

FOR UNDERGRADUATES AND GRADUATES

2. **ADVANCED BOTANY** PROFESSOR CLEMENTS, ASSISTANT PROFESSORS
TILDEN AND ROSENDAHL
Six credits (six hours per week) Both semesters
Open to those who have completed course 1; the laboratory fee is three dollars per semester.

A study of the structure and classification of the great groups of plants, based on identification; the details of cell-division, of the formation of tissue, and of reproduction; and the general relations of the plant to the physical factors of its home. Lectures and quizzes, laboratory, greenhouse and field work.

SPECIAL COURSES

3. **PLANT PHYSIOLOGY AND ECOLOGY** PROFESSOR CLEMENTS AND MR. HUFF
Six credits (six hours per week) Both semesters
Open to those who have completed courses 1 and 2; by permission of the department the course may be taken in conjunction with course 2; the laboratory fee is three dollars per semester.

A study of the factors that affect the plant and its response to them; the adaptations of plants and the origin of new forms; the structure and development of vegetation, as shown in migration, invasion, competition, etc. Lectures and quizzes, greenhouse and field work.

4. **ALGAE** ASSISTANT PROFESSOR TILDEN
Six credits (six hours per week) Both semesters
Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

A detailed comparative study of the structure and classification of the algae; the blue-green and yellow-green algae, together with a systematic examination of forms in the Minneapolis water supply, occupy the first semester, and the brown and the red marine algae the second semester. Lectures, laboratory and reference work.

5. **FUNGI** PROFESSOR CLEMENTS
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The classification and life-history of the various groups of fungi, based on identification, cultures and field work, with particular reference to forms which cause plant and animal diseases. Lectures and discussions, laboratory, greenhouse and field work.

6. **MOSESSES AND FERNS** ASSISTANT PROFESSOR ROSENDAHL AND MR. HUFF
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The course is designed for students who wish to pay special attention to the morphology and taxonomy of liverworts, mosses, and ferns. Lectures, laboratory and field work.

7. **FLOWERING PLANTS** ASSISTANT PROFESSOR ROSENDAHL
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The course is designed to afford the student an opportunity to become proficient in the determination of plant species and plant types, as well as to show the genetic development and relationships of the flowering plants. Lectures, reference reading, laboratory, greenhouse and herbarium work, together with field work in the fall and spring.

8. **ECOLOGY** PROFESSOR CLEMENTS
 Six credits (six hours per week) Both semesters
 Open to those who have completed course 1, 2 and 3; the laboratory fee is three dollars per semester.

A critical study of plant habitats by means of instruments, and the adaptations produced by water and by light, together with a careful examination of the causes and reactions of plant formations. Class discussions and quizzes, field and greenhouse work.

9. **PLANT PHYSIOLOGY** PROFESSOR CLEMENTS
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1, 2 and 3; the laboratory fee is three dollars per semester; alternates with course 8.

A study of the relations of factor, function and structure in the various organs of the plant, with special reference to absorption, transpiration, photosynthesis, respiration, irritability and reproduction. Class discussions and quizzes, greenhouse and field work.

10. **CYTOLOGY** ASSISTANT PROFESSOR ROSENDAHL
 Six credits (six hours per week) Both semesters
 Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

The course includes a survey of cell structure and the various phenomena of division, fusion and metamorphosis, together with a review of the history of cytologic investigation. Methods of cytological research indicated in the laboratory. Laboratory work and collateral reading.

11. **INDUSTRIAL BOTANY** ASSISTANT PROFESSOR TILDEN
 Six credits (six hours per week) Both semesters

12. **WOOD TECHNOLOGY** PROFESSOR CLEMENTS AND MR. BUTTERS
Six credits (six hours per week)
Open to those who have had course 1; the laboratory fee is three dollars per semester.

A critical study of the most important woods, with especial reference to their structure, differences and uses and the life history and relationship of the various genera.

13. **WATER SUPPLY BOTANY** ASSISTANT PROFESSOR TILDEN
Three credits (six hours per week) Second semester
Open to those who have completed course 1; the laboratory fee is three dollars.

A technical course for municipal, sanitary and reclamation engineers involving the determination of the forms prevalent in storage waters and in water supplies, and their abundance, together with methods of control or prevention. Lectures and references, laboratory and field work.

14. **TIMBER AND TIMBER DISEASES** MR. HUFF
Three credits (six hours per week) First semester
Open to those who have completed course 1; the laboratory fee is three dollars.

A study of the source and structure of the important timbers with particular reference to their mechanical properties, together with a study of timber diseases, and methods of timber preservation. Lectures, laboratory work, and references.

15. **BOTANICAL MICROCHEMISTRY** PROFESSOR CLEMENTS
Six credits (six hours per week) Both semester
Open to those who have completed course 1; laboratory fee is three dollars.

A microscopical study by means of stains and reagents of the nature and structure of plant substances, in the natural condition as well as in the finished product. Lectures, laboratory and reference work.

16. **PLANT STUDIES AND METHODS** PROFESSOR CLEMENTS
Six credits (six hours per week) Both semester
Open to those who have completed courses 1 and 2; the laboratory fee is three dollars per semester.

A course for teachers and for students intending to teach; the subjects of nature study and high school botany are presented as they are to be taught and not from the university point of view; the material is taken up in detail in its proper sequence, and training in method is afforded as far as possible by practice in the elementary school of the College of Education.

FOR GRADUATES

17. **MORPHOLOGY AND TAXONOMY** ASSISTANT PROFESSOR ROSENDAHL
Both semester
Open to graduate students; other arrangements may be ascertained upon application to the department.

Important literature and necessary material will be provided for whatever research is entered upon, and the results of the investigations will be required to be prepared for publication. The course is an elastic one and will be adapted to the special training and requirements of those pursuing it.

18. **PROBLEMS IN ALGOLOGY** ASSISTANT PROFESSOR TILDEN
Both semester
Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be done on special groups or along any of the following lines: The freshwater algae of Minnesota; the algae of the Minneapolis and St. Paul water supplies; the algae of hot springs; lime-depositing algae; arctic marine algae (material from Vancouver Island); tropical marine algae (material from the Hawaiian Islands). Special facilities for study are offered by the Minnesota Seaside Station on Vancouver Island, which is open during the summer vacation.

19. PROBLEMS IN PHYSIOLOGY AND ECOLOGY**PROFESSOR CLEMENTS****Both semesters**

Open to graduate students; other arrangements may be ascertained upon application to the department.

Opportunity for research work in ecology and physiology is offered along the following lines: Critical investigation of the physical factors of the habitat by means of instruments; studies in plant functions and adaptations; the experimental production of new forms; investigations in the development and structure of vegetation, and especially in migration, competition, etc.

20. PROBLEMS IN CYTOLOGY AND EMBRYOLOGY**PROFESSOR CLEMENTS****Both semesters**

Open to graduate students; other arrangements may be ascertained upon application to the department.

Research work may be taken along any of the following lines: The minute structure of the cell; microchemistry of the cell; development of sporangia and spores; fecundtion; development of the embryo; origin and development of the primary tissues; development of organs; correlation, etc.

CHEMISTRY**FOR UNDERGRADUATES AND GRADUATES****4. QUANTITATIVE ANALYSIS (Gravimetric)****PROFESSOR SIDENER**

Three credits (six hours per week)

First semester

Open to those who have completed course 3; the laboratory fee is five dollars.

Lectures and laboratory work. The course includes an introduction to quantitative and a beginning of gravimetric analysis.

5. QUANTITATIVE ANALYSIS (Volumetric)**PROFESSOR SIDENER**

Three credits (six hours per week)

Second semester

Open to those who have completed course 4; the laboratory fee is five dollars.

Lectures and laboratory work. The course includes an introduction to volumetric analysis with a discussion of standard solutions and the necessary stoichiometric calculations.

6. ORGANIC CHEMISTRY**PROFESSOR FRANKFORTER, ASSISTANT****PROFESSORS DERBY AND HARDING**

Six credits (six hours per week)

Both semesters

Open to those who have completed course 3.

Lectures and laboratory work. The course includes the aliphatic and aromatic series with a preparation of the more important compounds.

8. SPECIAL INORGANIC CHEMISTRY

Open to graduate students; other arrangements may be ascertained upon application to the department.

9. ELECTRO-CHEMISTRY

Open to graduate students; other arrangements may be ascertained upon application to the department.

10. ORGANIC CHEMISTRY

Open to graduate students; other arrangements may be ascertained upon application to the department.

11. THE ALKALOIDS

Open to graduate students; other arrangements may be ascertained upon application to the department.

12. ANALYTICAL CHEMISTRY

Open to graduate students; other arrangements may be ascertained upon application to the department.

FOR GRADUATES

No specific courses are offered to graduate students. A thesis may be chosen from one of the following lines of work provided the student has had sufficient preparation to enable him to pursue the work satisfactorily:

General Inorganic Chemistry.

Electro Chemistry.

Physical Chemistry.

General Organic Chemistry with the following special topics:

(a) The Alkaloids. (b) The Terpenes. (c) The Resins. Seniors who have specialized in any of these lines of work, may choose their undergraduate thesis from this list of topics.

COMPARATIVE PHILOLOGY

This department, besides offering courses in the general principles of linguistic science, affords an opportunity for elementary studies in comparative Indo-European philology, and more particularly the investigation of Old Germanic dialects. Related courses in English philology will be found under English language and literature.

FOR UNDERGRADUATES AND GRADUATES.

5. INTRODUCTION TO TEUTONIC PHILOLOGY PROFESSOR KLAEBER
 One credit (one hour per week) Second semester
 Open to sophomores, juniors, and seniors, who have a fair knowledge of German; alternates with course 4.
 History of Germanic philology, biographies of leading scholars (J. Grimm and others). Classification of the Germanic languages. Rapid survey of the various branches of the Teutonic group (Gothic, Norse, English, Frisian, Dutch, Low German, High German).
6. COMPARATIVE PHONOLOGY OF ENGLISH AND GERMAN PROFESSOR KLAEBER
 Three credits (three hours per week) Second semester
 Open to sophomores, juniors, and seniors who have a fair knowledge of German.
 Elements of phonetics; history of English and German sounds; orthography. The lectures will be supplemented by practical exercises.

FOR GRADUATES

7. COMPARATIVE GRAMMAR OF THE GREEK, LATIN, AND GERMANIC LANGUAGES PROFESSOR KLAEBER
 Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
 A general survey of the field of Indo-Germanic philology will be included.
8. GOTHIC PROFESSOR KLAEBER
 Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
 The relation of Gothic to other Germanic dialects will be particularly emphasized. Study of the grammar (Braune, J. Wright, Streitberg) and reading of the gospels (Heyne's *Ulfilas*, 10th edition).
9. URGERMANISCHE GRAMMATIK PROFESSOR KLAEBER
 Open to graduate students who have completed course 8; other arrangements may be ascertained upon application to the department.
 Lectures and study of standard works (Brugmann, Kluge, Noreen, Streitberg, etc.).
10. OLD SAXON PROFESSOR KLAEBER
 Open to graduate students who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
 Old Saxon Grammar and interpretation of the *Heliand*.
11. OLD HIGH GERMAN PROFESSOR KLAEBER
 Open to graduates who have taken an undergraduate major in a linguistic subject; other arrangements may be ascertained upon application to the department.
 Braune's *Althochdeutsche Grammatik*; Braune's *Althochdeutsches Lesebuch*.
 This course is identical with German 14.

ECONOMICS

FOR GRADUATES AND UNDERGRADUATES

4. **ADVANCED ECONOMICS** PROFESSOR ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1; required for a major in economics.
 An advanced course in general economics, devoted largely to a study of recent theories of distribution.
 Assigned readings, reports, and discussions.

5. **MONEY AND BANKING** DR. PHELAN
 Three credits (three hours per week) Repeated each semester
 Open to those who have completed course 1.
 The history and theory of money; nature and uses of credit; functions of banks, trust companies, and other financial institutions; foreign exchange and the settlement of international balances. Lectures, text-book, assigned readings, and discussions.

28. **FINANCIAL HISTORY OF THE UNITED STATES** DR. PHELAN
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 1 and 5.
 The main lines of our financial development, including our monetary and banking history, are traced by means of lectures. Readings in the literature of the subject and topics for investigation are assigned. Lectures, text-book, assigned readings, topics, and discussions.

6. **PUBLIC FINANCE** PROFESSOR ROBINSON
 Three credits (three hours per week) First semester
 Open to those who have completed course 1.
 The development of the state as an economic organism. Public expenditures from the view point of public wants. Budget systems of the leading countries with special emphasis on the United States. Public revenues from public domains and industries. Principles, incidents, and administration of taxation. The theory of public debts. Text-books, supplemented by lectures and assigned readings.

7. **PROBLEMS IN TAXATION** PROFESSOR ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 6.
 Study of tax systems, tax reforms, and special forms of taxation, such as the mortgage, corporation, and inheritance taxes. Based on Seligman, *Essays in Taxation*, and reports of state tax commissions with lectures and reports on special topics.

8. **ECONOMICS OF TRANSPORTATION AND COMMUNICATION** PROFESSOR ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1 and to students in the technical colleges.
 A general course on the history and theory of transportation and communication with special reference to the United States; early routes and methods of migration and commerce; causes determining the location of railways; effect of steam and electricity in the consolidation of industries and of nations; signal systems, the post, telegraph and telephone; parcels post and express service; economic functions and relations of highways, interurban electric lines, steam railways, inland waterways, and ocean transportation; the organization of ocean commerce. Lectures, assigned readings, and discussions.

9. **RAILWAY ECONOMICS** PROFESSOR ROBINSON
 Three credits (three hours per week) First semester
 Open to those who have completed courses 1 and 8, and to students in the technical colleges.
 An advanced course devoted to the study of railway problems and administration, including: (1) conditions affecting economy of operation; (2) passenger and goods traffic; (3) economic principles underlying the making of railway rates; (4) competition in relation to rate wars, discrimination between persons, places, and commodities, pooling, and various forms of combination; (5) the great railway systems of the United States; (6)

regulation by the states and the federal government; (7) government ownership and operation of railways in Europe and Australasia. Lectures, assigned readings, and special topics.

11. **THE MODERN BUSINESS CORPORATION** PROFESSOR GRAY
 Three credits (three hours per week) First semester
 Open to those who have completed course 1.

The organizing, financing, and managing of corporations; the position of the corporation before the law; methods of accounting; the relation of the government to the corporation; the question of trusts in its various phases. Text-books: Ripley, *Trusts, Pools, and Corporations*, Meade's *Trust Finance*, Wyman's *Cases*. Lectures, class discussions, and reports.

10. **MUNICIPAL INDUSTRIES** PROFESSOR GRAY
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1; if possible, should be preceded by course 11.

The causes and the social and economic effects of the recent rapid development of municipal industries. A comparison of the results of public and of private ownership of such industries. The general question of municipal ownership. Text-books, lectures, and quizzes.

12. **ECONOMICS OF COMMERCE** PROFESSOR ROBINSON
 Three credits (three hours per week) First semester
 Open to those who have completed course 1, 2, or 3.

Causes and characteristics of commercial crises; theory and mechanism of international commerce; free trade, reciprocity and protection; the balance of trade; economic causes of the contest for foreign markets; organization of the export trade, commercial treaties and foreign politics, the consular and diplomatic service as a factor in commerce. Lectures, assigned readings, and reports on special topics.

13. **ECONOMICS OF COLONIZATION** PROFESSOR ROBINSON
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1, 2, or 3.

The economic causes of human migration; historical survey of colonization and classification of colonies with reference to their economic bases: existing colonial systems, with special attention to the outlying possessions of the United States; colonial commerce in relation to modern commercial and foreign policies; preferential tariffs and imperial federation. Lectures, assigned readings, and reports on special topics.

26. **SOCIAL THEORIES** DR. PHELAN
 Three credits (three hours per week) First semester
 Open to those who have completed course 1.

A survey of social Utopias from Plato to Henry George, with special attention to modern scientific socialism as a philosophy of industrial evolution and as a program of economic reform. Lectures, assigned readings, reports, and discussions.

27. **THE STATE IN RELATION TO INDUSTRY** Second semester
 Three credits (three hours per week)
 Open to those who have completed courses 1 and 26.

A study of the influence exercised by society and by the state on the production and distribution of wealth. The force of custom; effect of private property and other social institutions; the results of economic legislation designed to limit the freedom, or to raise the plane of competition. General survey of the relation of the state to industry. Lectures, assigned readings, and reports.

16. **LABOR PROBLEMS: Part I** DR. PHELAN
 Three credits (three hours per week) First semester
 Open to those who have completed course 1.

Labor unions, strikes, systems of wage payment, arbitration, poverty, child labor, etc. Efforts, public and private, to secure justice and social well-being. Lectures, text-book, assigned readings, and discussions.

17. **LABOR PROBLEMS: Part II** DR. PHELAN
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1, but should also be preceded by course 16.

A study of races and immigrants in America, with reference to their economic and social contributions; the economic and social conditions in

foreign countries that lead to emigration; the general problem of immigration; the special problems of the Slav, the Italian, the negro, the Chinese and the Japanese. Lectures, text-book, topics, and discussions.

18. CHARITIES AND CORRECTIONS WITH SPECIAL REFERENCE TO ECONOMIC CONDITIONS IN AMERICAN CITIES MR. LIES
 Three credits (three hours per week) First or second semester
 Open to those who have completed course 1, course 3, or sociology 1; required in the six-year medical course.

A study of the causes of economic dependence in American cities, the standard of living, and the constructive agencies for economic betterment. Given by lectures with assigned readings and visits of inspection in the Twin Cities.

19. THE PRINCIPLES OF ACCOUNTING ASSISTANT PROFESSOR ROSTALL
 Six credits (three hours per week) Both semesters
 Open to those who have completed course 1.

The theory and practice of accounting, with a view to general business efficiency. Methods employed in manufacturing, mercantile, banking, and railway accounting. Analysis of industrial, bank, and railway reports. Lectures and exercises.

20. ELEMENTS OF BUSINESS LAW DR. PHELAN
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1.

The principles of law governing ordinary commercial transactions. The aim is to teach so much of the law as every educated man ought to know for his guidance in everyday business affairs. Assigned readings, lectures and quizzes.

22. BUSINESS ORGANIZATION ASSISTANT PROFESSOR ROSTALL
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1.

A study of the internal organization and management of large-scale industry, covering typical manufacturing and mercantile concerns.

Based on Sparling's *Introduction to Business Organization*, with lectures, assigned readings, and discussions.

23. ECONOMICS OF FORESTRY AND IRRIGATION MR. COULTER
 Three credits (three hours per week) First semester
 Open to those who have completed course 1 or course 2.

Preliminary survey of forest controls and forest influences. In this connection, special attention to the progress of the national irrigation works in relation to economic development, land laws, and land tenure. Location and value of the extant forest resources of the United States. Intensive study of the forest industry, covering: (1) history and processes, (2) employees, (3) division into stages (logging, sawing, etc.), (4) internal organization of each, (5) transportation and marketing, (6) economic relations to other industries, (8) share of forest products in foreign commerce, (9) economic necessity of a scientific system of forestry. Lectures, assigned reading, and reports.

14. ECONOMICS OF AGRICULTURE MR. COULTER
 Three credits (three hours per week) Second semester
 Open to those who have completed course 1 or course 2, and to others by special permission of the instructor.

Preliminary survey and classification of industries as extractive, manufacturing, and distributive; and comparison of the several extractive industries in the United States, viz. fishing, forestry, grazing, farming, and mining. Historic development of agriculture and comparison of existing systems, with reference to stage of economic development and geographic conditions. Transition in the United States from extensive to intensive, and from general to specialized farming in relation to the law of decreasing returns. Markets, transportation facilities, and other causes affecting the value of land and the prices of farm products. The size, organization, labor-system, and ownership of farms as bearing on economic efficiency and social and political conditions. Lectures, assigned readings, reports on special topics, and quiz.

15. **ECONOMICS OF INSURANCE** ASSISTANT PROFESSOR ROSTALL
 Three credits (three hours per week) First semester
 Open to those who have completed course 1 and to others by
 special permission of the department.

Functions of insurance: life, fire, marine, accident, fidelity; history and theory of life insurance, forms of standard policies, public supervision. The aim is to treat those aspects of insurance which are of importance to practical men of affairs.

25. **ECONOMICS OF INVESTMENT AND SPECULATION** ASSISTANT PROFESSOR ROSTALL
 Three credits (three hours per week) First semester
 Open to juniors and seniors who have completed course 5.

The causes affecting the values of securities; classes of investments and methods of calculating income; bearings of investment on the formation of social classes; the economic functions of speculation; organization and working of stock and produce exchanges; their relation to industry and to the money market; the work of Wall Street. Lectures, assigned readings, and exercises in the interpretation of current quotations for securities.

FOR GRADUATES

29. **THEORY AND PRACTICE OF STATISTICS** ASSISTANT PROFESSOR ROSTALL
 Two credits (two hours per week) First semester
 Open to those who have completed six credits in economics.

An introduction to the theory and method of statistics; aspects of economic and social life which are capable of statistical measurement; use and limitations of index numbers; theory of prices and price levels; based on the works of Bowley and Mayo-Smith, with lectures and practical exercises.

30. **HISTORY OF ECONOMIC THOUGHT** PROFESSOR ROBINSON
 Two credits (two hours per week) First semester
 Open to those who have completed six credits in economics.

A survey of economic thought, especially since Adam Smith. Emphasis is placed on the most recent period. Lectures, assigned readings, and reports on special topics.

24. **SCOPE AND METHODS OF ECONOMICS** PROFESSOR ROBINSON
 Two credits (two hours per week) Second semester
 Open to those who have completed six credits in economics.

Consideration of the successive views which have prevailed as to the scope and logical method of economics; relation of economics to the other social sciences and to ethics. Lectures, assigned readings, and discussions.

21. **SEMINAR IN ECONOMICS** PROFESSORS GRAY AND ROBINSON,
 MR. GEROULD, ASSISTANT PROFESSOR ROSTALL,
 DR. PHELAN AND MR. COULTER

Six credits (three hours per week) Both semesters
 Open to graduate students and to seniors who have completed at least twelve credits in economics and are capable of making original investigations; both semesters must be completed before credit is given for the first semester.

A course in research and in methods of investigation. The course will be conducted jointly by all the instructors, each striving to be of special service to students who choose topics within the field of his special interests: Professor Gray in connection with local public service corporations; Professor Robinson in connection with taxation, transportation, and industries of importance in this section, such as wheat and iron; Dr. Phelan in connection with currency questions, labor, socio-economic theories, and taxation.

ECONOMIC ENTOMOLOGY

FOR GRADUATES

SPECIAL PROBLEMS IN ECONOMIC ENTOMOLOGY PROFESSOR WASHBURN

EDUCATION

FOR UNDERGRADUATES AND GRADUATES

Preliminary Requirements: Students who desire to undertake graduate work in education must have a general knowledge of psychology and of the

history of education, and some acquaintance with the theory of education. For a minor in education the candidate may pursue studies either in the theory and practice of elementary teaching, the organization and methods of secondary education, or in advanced educational theory and administration. Students who undertake a major in education are expected to do work in at least two of these fields. Selection will be made by the candidate on the approval of the head of the department from the following courses:

4. SECONDARY EDUCATION PROFESSOR JAMES
 Three credits (three hours per week) First semester
 Open to seniors who have completed courses 1 and 2.

A study of secondary education in the United States, with such references to the secondary schools of other countries as will lead to a clearer understanding of the place and function of the high school, its curriculum, the problems of present-day importance, and the relation of the high school to other parts of the system of public instruction. The course will be conducted by lectures, reports, and discussions.

5. PRINCIPLES AND ORGANIZATION OF ELEMENTARY TEACHING PROFESSOR RANKIN
 Three credits (three hours per week) First semester
 Open to seniors who have completed courses 1 and 2 and philosophy 1.

This course includes a consideration of the course of study of the elementary school and of the best methods of instruction. It is conducted by means of lectures, assigned readings, discussions and reports. It is planned for all students who expect to teach in the high school or to be principals or superintendents. No credit is given in this course to graduates of normal schools who have received one year's credit at the University.

6. PRINCIPLES AND ORGANIZATION OF SECONDARY TEACHING PROFESSOR RANKIN
 Three credits (three hours per week) Second semester
 Open to seniors who have completed courses 1 and 2, and who have completed course 4 or are pursuing course 10.

This course includes lectures on the general methods of secondary teaching, assigned readings, reports, and discussions. It is planned more particularly for those who expect to teach in high schools.

8. SCHOOL ADMINISTRATION PROFESSOR RANKIN
 Three credits (three hours per week) First semester
 Open to seniors who have completed courses 1 and 2.

An introductory study of school administration, conducted by lectures, reports, and discussions; the organization of school systems, the work of school boards, superintendents, principals, and teachers. This course is planned for students without any teaching experience, who hope later to do work in supervision.

9. SCHOOL SUPERVISION PROFESSOR RANKIN
 Three credits (three hours per week) Second semester
 Open to seniors; intended only for students with experience in teaching; credit will not be given both for course 8 and for course 9.

An advanced course treating of the duties of principals and superintendents.

10. COMPARATIVE STUDY OF SCHOOL SYSTEMS PROFESSOR JAMES
 Three credits (three hours per week) Second semester
 Open to seniors who have completed courses 1 and 2.

This course deals with the school systems of Germany, France, England, and the United States, with special reference to principles and methods of administration. Elementary, secondary, and higher institutions are examined with emphasis varying in successive years. The course is conducted partly by lectures and partly by assigned readings, reports, and discussions.

FOR GRADUATES

11. MODERN EDUCATIONAL THEORIES PROFESSOR JAMES
 Three credits (three hours per week) Second semester
 Open to seniors who have completed courses 1 and 2, and philosophy 1.

An advanced course in educational theory, dealing particularly with the contributions of Rousseau, Froebel, and Herbart, special emphasis being laid upon one of these writers in each successive year.

12. **CURRENT PROBLEMS IN ELEMENTARY TEACHING** **PROFESSOR RANKIN**
 Two credits (two hours per week) First semester
 Open to seniors and graduate students who have completed course 5.

This is a seminar course, involving a general discussion of some current problems in elementary education, one or two of which are worked out practically by the student under the direction of the instructor through readings, the visiting of schools, and through class discussions.

13. **EDUCATIONAL CLASSICS** **PROFESSOR JAMES**
 Two credits (two hours per week) First semester
 Open to seniors who have completed courses 1 and 2, and to graduate students.

A seminar course for the reading of selected educational classics and for the detailed study of corresponding periods in educational history.

14. **CURRENT PROBLEMS IN SECONDARY TEACHING** **PROFESSOR RANKIN**
 Two credits (two hours per week) Second semester
 Open to seniors and graduate students who have completed course 6.

This is a seminar course for advanced students, preferably with teaching experience, or who wish to pursue a theoretical and a practical study of some current problems in connection with secondary teaching. The course will be conducted by lectures, class discussions, readings, and by the visiting of schools.

15. **PROBLEMS IN SCHOOL ADMINISTRATION** **PROFESSOR JAMES**
 Two credits (two hours per week) Second semester
 Open to seniors and graduate students who have completed courses 1 and 2.

A research course for advanced students, preferably with teaching experience, who desire to take up the investigation of some question of educational administration. The course will be conducted by lectures, class discussions, assigned readings, and, when possible, by a study of actual school conditions falling within the proposed field.

16. **SCHOOL SANITATION** **PROFESSOR RANKIN**
 Two credits (two hours per week) First semester
 Open to seniors and graduate students.

This course will be conducted by text, by lectures, and by investigations into problems of school lighting, heating, ventilation, and other questions of school architecture and management connected with the physical well-being of the pupils.

17. **ORGANIZATION OF HIGHER EDUCATION** **PROFESSOR JAMES**
 One credit (one hour per week) Second semester
 Open to seniors and graduate students who have completed courses 1 and 2.

This course is intended for students who are interested in the general problems of educational administration and who look forward later to college teaching. It includes an historical sketch of the development of the American university, with discussions of modes of organization and administration problems of departmental teaching, and questions of class instruction.

ELECTRICAL ENGINEERING

The courses offered by the department of electrical engineering are open to graduate students having the required preliminary training. Thorough courses in physics and mathematics are essential prerequisites. The laboratory, shop and library of the department provide facilities for a moderate amount of research work in addition to the regular courses of study.

The laboratory equipment includes about forty dynamo electric machines of various types and sizes for direct and alternating currents, such as constant current and constant potential direct current generators and motors, single phase and polyphase alternators, commutating, induction and synchronous motors and rotary converters, each furnished with suitable regulating devices. A number of these machines have been equipped with special devices for experimental purposes. Lamps, rheostats, batteries, fans and brakes afford convenient and ample means for taking up the energy of dynamos and motors. To facilitate testing, there are a number of pairs of similar machines. A three-ton traveling crane facilitates handling the machines. Power is ob-

ained from a main shaft driven by the engines of the lighting plant, or by motors connected with the University power circuits, with a storage battery or with the circuits of The Minneapolis General Electric Company, which supplies direct current at 500 volts and alternating current at 2,250 volts. The laboratory has equipment for obtaining low voltage direct or alternating current up to 2,000 amperes, for continuous EMF to up to 2,000 volts and for alternating EMF up to 40,000 volts. An excellent assortment of instruments of well-known American and foreign makers is available for laboratory use. A well equipped standardizing laboratory furnished with certain standards of current electromotive force and resistance, allows the frequent checking of instruments, so that students may work to any desired degree of refinement. The meter and lamp testing laboratories are furnished with a wide variety of arc and incandescent lamps and meters with all necessary standards and their accessories. The electro-chemical laboratory provides facilities for the construction and testing of various cells, for electro-plating and other electrolytic processes and for the formation and study of electric furnace products. Alternators, rotary converters, transformers, lamps, motors, condensers, special apparatus and suitable instruments afford facilities for the experimental study of alternating currents. Telephone transmitters, receivers and accessories provide for practice in assembling and testing the ordinary telephonic apparatus and circuits and for investigation.

The department library contains an excellent collection of electrical and allied works, including a full set of United States Patent Office Gazettes. New books and trade publications are being added continually. Files of twenty-two journals are nearly complete and others are being collected and bound. These, with the files in the general and other departmental libraries of the University, offer excellent facilities for research work. The reading room receives regularly the leading American and foreign periodicals devoted to electrical engineering and allied interests.

FOR UNDERGRADUATES AND GRADUATES

- . **APPLIED ELECTRICITY** PROFESSOR SHEPARDSON
 Three credits (three hours per week) Second semester
 Required of juniors E. E. course.
 Preparation, course 5 P.
 Outline of industrial uses of electricity; applications of Ohm's law; methods and calculation of wiring.

- . **ELECTRICAL MACHINERY** PROFESSOR SPRINGER
 Three credits (six hours per week) First and second semesters
 Preparation, courses E. E. 1, P. 5, 6, and M. 5, 6.
 Electrical engineering measuring instruments and their use; units; theory of dynamo electric machinery; methods of regulation, construction and operation of generators and motors; methods of testing.

- . **ALTERNATING CURRENTS** PROFESSOR SHEPARDSON
 Two or three credits (two or three hours per week) First and second semesters
 Post senior year. Preparation: courses 1, 2.
 Phenomena, measurement and use of alternating currents; theory of line, transformer, generator and motor; types of apparatus.
 Text-book: Steinmetz, Alternating Current Phenomena.

- . **ELECTRICAL ENGINEERING PRACTICE. Batteries** MR. RYAN
 One credit (one hour per week) First semester
 Post senior year. Preparation: course 2.
 General theory of primary and secondary cells; types and methods of construction; commercial applications; operation of battery plants; construction and test of cells by students; test of a commercial plant. Text-book: Lyndon, Storage Battery Engineering.

- . **ELECTRICAL ENGINEERING PRACTICE. Lighting** PROFESSOR SHEPARDSON
 One credit (one hour per week) First semester
 Post senior year. Preparation: course 2.
 Comparison of different sources of light; photometry; physics of the arc; history, design and regulation of arc lamps; adaptation to constant current, constant potential and A. C. circuits; carbons; history, manufacture and economy of incandescent lamps; distribution of light.

9. **ELECTRICAL ENGINEERING PRACTICE. Central stations** **MR. RYAN**
 Two credits (two hours per week) First or second semester
 Post senior year. Preparation: courses 2 and 6 E. E.
 Preliminary surveys; choice of electrical systems; load diagrams; best units of power; comparison of steam, gas and water power; location, design and erection of station buildings; boilers, engines, dynamos, storage batteries, switch board and lines; operation and regulation; maintenance of plant; emergencies; examination of stations in Minneapolis and St. Paul.
10. **ELECTRICAL ENGINEERING PRACTICE. Railways** **PROFESSOR SPRINGER**
 One credit (one hour per week) Second semester
 Post senior year. Preparation: E. E. 2 or E. E. 4.
 History and development; different systems of distribution; location and calculation of feeders; line and track construction; choice of motors, trucks, generators and engines; operation and repairs. Text-book: Gotshall, Electric Railway Economics.
11. **ELECTRICAL ENGINEERING PRACTICE. Transmission** **PROFESSOR SHEPARDSON**
 One credit (one hour per week) Second semester
 Post senior year. Preparation: courses 1, 2 and 5 E. E.
 Utilization of natural forces; various methods of transmission; theory of electric motor; power distribution with constant current, constant potential and alternating systems; design of line; study of particular plants.
12. **ELECTRICAL ENGINEERING PRACTICE. Telegraph and telephone** **PROFESSOR SHEPARDSON**
 One or two credits (one or two hours per week) Second semester
 Post senior year. Preparation: E. E. 1 and E. E. 5.
 Various systems and instruments used in local and long distance telegraphy and telephony; design and construction of switchboards and lines; protection from inductive and other disturbances; police, fire alarm and district messenger systems.
13. **ELECTROCHEMISTRY** **PROFESSOR SHEPARDSON**
 One or two credits (one or two hours per week) First or second semester
 Post senior year.
 Theoretical and experimental study of electrolytic and electrothermal processes.
14. **ELECTRICAL DESIGN** **MR. RYAN**
 Three credits (six hours per week) First semester
 Post senior year. Preparation: courses 1 and 2 P., courses E. E. 1, 2 and M. E. 13.
 Problems in designing circuits, electro-magnets and dynamos; complete working drawings and specifications to accompany each design.
15. **ELECTRICAL DESIGN** **MR. RYAN**
 Three credits (six hours per week) Second semester
 Post senior year. Preparation: courses 6 and 14 E. E.
 Design of a transformer, switchboard and other problem.
16. **ELECTRICAL DESIGN** **MR. RYAN**
 Two credits (four hours per week) Second semester
 Post senior year. Preparation: courses 8 and 14 E. E.
 Designs, specifications and estimates for an electric light or power plant.
17. **ELECTRICAL LABORATORY** **PROFESSOR SPRINGER**
 Three credits (six hours per week) First and second semesters
 Senior year. Preparation: courses P. 5, 6 and 1 and 2 E. E.
 Tracing circuits and locating faults; electrical engineering measurements; calibration of instruments; operation and characteristic curves of generators and motors.
18. **ELECTRICAL LABORATORY** **PROFESSOR SPRINGER**
 Three credits (six hours per week) First and second semesters
 Post senior year.
 Experimental study of alternating currents; regulation and efficiency tests of alternators, transformers, motors and rotaries; photometric tests of incandescent and arc lamps.

19. **ELECTRICAL LABORATORY** PROFESSOR SHEPARDSON, PROFESSOR SPRINGER
One or two credits (two or four hours per week) First or second semester
Post senior year. Efficiency tests and special problems
20. **ELECTRICAL ENGINEERING MEASUREMENTS** PROFESSOR SPRINGER
Application of measurements to electrical engineering practice.
Lectures and laboratory.
21. **PLANT OPERATION** MR. RYAN, MR. DIXON
One credit (equivalent to two hours per week) First or second semester
Practice in operation and care of boilers, engines, motors, dynamos, battery and circuits of the University lighting plant.
22. **JOURNAL READING (Post senior I and II (1))** PROFESSOR SHEPARDSON
One credit First and second semesters
Post senior year.
Weekly discussion of current electrical periodicals. The class meets monthly with the Minnesota Section of the American Institute of Electrical Engineers.
23. **PRECISE ELECTRICAL ENGINEERING MEASUREMENTS** PROFESSOR SPRINGER
Preparation: course 19.
Lectures and laboratory work. Precise measurements of resistance, voltage, current, self-induction, and capacity; standardization of measuring instruments. Open to a limited number subject to approval.
24. **ILLUMINATING ENGINEERING** PROFESSOR SHEPARDSON
Lectures and laboratory work. Investigation of performance of electric and gas lamps, reflectors and diffusers; luminous efficiency, distribution, color characteristics, physiological phenomena, methods of determining location, kind and quantity of lights for obtaining desired illumination.
25. **TELEPHONE ENGINEERING** PROFESSOR SHEPARDSON, PROFESSOR EDDY
Lectures and laboratory work. Theoretical and experimental study of telephonic apparatus; lines and line phenomena, including induction, transportations, loading coils, etc.
26. **ALTERNATING CURRENT PHENOMENA** PROFESSOR SHEPARDSON
Lectures and laboratory work. Study of wave forms, transient phenomena; oscillographic investigations; tests of apparatus.

ENGLISH LANGUAGE AND LITERATURE

FOR GRADUATES AND UNDERGRADUATES

3. **EARLY ENGLISH** PROFESSOR KLAEBER, ASSISTANT PROFESSOR BEACH
Six credits (three hours per week) Both semesters
Open to sophomores, juniors and seniors; required of all who take a major or obtain a teacher's certificate.
A study of the language and reading of representative selections of old English prose and poetry. The relation to the modern English will be particularly emphasized.
4. **INTRODUCTION TO MIDDLE ENGLISH LANGUAGE AND LITERATURE** PROFESSOR KLAEBER
Two credits (two hours per week) First semester
Open to sophomores, juniors, and seniors, who have taken the first semester of course 3; alternates with course 5.
An outline of middle English grammar including the interpretation of selected texts.
5. **PIERS THE PLOWMAN** PROFESSOR KLAEBER
Two credits (two hours per week) First semester
Open to sophomores, juniors and seniors, who have taken the first semester of course 3; alternates with course 4; not given in 1908-9.
A critical study of *Piers the Plowman*.

13. **THE BIBLE AS LITERATURE** ASSISTANT PROFESSOR POTTER
 Three credits (three hours per week) Second semester
 Open to juniors and seniors.
 A literary study of the Old Testament with special attention to forms and the critical study of selected readings.
16. **CONSTRUCTION AND DEVELOPMENT OF THE MODERN DRAMA** ASSISTANT PROFESSOR PECK
 Six credits (three hours per week) Both semesters
 Open to seniors who have completed two years of work in English, which must include course 15.
 First semester: a study of the theory of the drama, with the history of English drama to the middle of the nineteenth century. Second semester: a study of the inter-relation of the English with the continental drama in the late nineteenth century with special emphasis upon Ibsen.
19. **HISTORY OF LITERARY CRITICISM** PROFESSOR BURTON
 Two credits (one hour per week) Both semesters
 Open to juniors and seniors; both semesters must be completed before credit is given for the first semester.
 This course traces the rise, growth and present condition of the principles of criticism as applied to literature.
23. **SENIOR SEMINAR IN ENGLISH** ASSISTANT PROFESSOR PECK
 Two credits (one hour per week) Both semesters
 Open to seniors who have taken courses 3 and 4 or any of the following courses: 6, 19, 20, 22.
 Hakluyt's Voyages will be studied in 1908-9. The work will consist of an inquiry into the vivid and dramatic sources of the language and literature found in this "prose epic" of the Elizabethan seamen.

FOR GRADUATES

24. **ANGLO-SAXON** PROFESSOR KLAEBER
 First semester
 Open to graduates who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.
25. **BEOWULF** PROFESSOR KLAEBER
 Second semester
 Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.
26. **PRINCIPLES OF CRITICISM** MR. FIRKINS
 Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.
 This course comprises a brief treatment of the elements or forces in literature, e. g., clearness, vigor, beauty, precision, art, taste, humor, truth, ethics, and the like; an exposition of literary types, e. g., lyric, epic, drama, short story, novel, biography, etc., in relation to the standards and methods of judging each.
27. **SHAKESPERE** ASSISTANT PROFESSOR POTTER
 Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.
28. **THE DRAMA AS A LITERARY FORM** PROFESSOR BURTON
 Both semesters
 Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.
29. **THE DRAMA AS A LITERARY FORM** PROFESSOR BURTON
 Both semesters
 Open to graduate students who have taken an undergraduate major in English; other arrangements may be ascertained upon application to the department.

FORESTRY

Equipment: The vast lumbering operations in the northern part of Minnesota offer the best of opportunities for a study of that branch of forestry. The establishment of the Chippewa Forest Reserve and its management by the Forest Service gives opportunities which few other sections possess to study the best methods of forest management. The state has twenty-one thousand acres of timber land to be used as a forest and game preserve, on which student help will be largely used. In addition Itasca state park, consisting of 22,000 acres, is used by the Forestry School as a demonstration forest and experiment station. Every student spends about twelve months in the park during his course and does practical work in all branches. The use of this park gives the Minnesota Forestry School a forest equipment which is unsurpassed anywhere.

Graduate work is offered to those who have sufficient preparation to pursue it to advantage. Two courses are offered but others may be given if conditions seem to make it desirable.

1. **FOREST MANAGEMENT AND ECONOMICS** PROFESSOR GREEN
A general course in economics as applied to the problem of properly handling forest wealth.
2. **WORKING PLANS FOR FORESTS** PROFESSOR GREEN
The study and discussion of the working plans in use in foreign countries. Criticism of working plans in the United States.

EXPERIMENTAL ENGINEERING

FOR GRADUATES AND UNDERGRADUATES

1. **MATERIALS TESTING LABORATORY** PROFESSOR KAVANAUGH, MR. SHOOP
Two credits (lecture and laboratory) First semester
Required of seniors. Open to those pursuing course M. 7.
Investigation of the strength and physical qualities of iron, steel, brass, copper, wood, belting, ropes, chains and cement. Supplemented by lectures on the various materials of construction and standard methods of testing.
2. **STEAM LABORATORY** PROFESSOR KAVANAUGH, MR. SHOOP
Two credits (lecture and laboratory) Second semester
Required of senior E. E. Open to those pursuing course 20 M. E.
Valve setting, indicator practice, calibration of gages, calorimetry, efficiency of screws, hoists and other machines.
3. **HYDRAULIC LABORATORY** PROFESSOR KAVANAUGH, MR. SHOOP
Two credits (lecture and laboratory) Second semester
Required of senior C. E. Open to those pursuing course M. 8.
Hydraulic measurements calibration of weirs, nozzles, orifices and meters. Tests of water motors, rams, pulsometers, steam and power pumps and other hydraulic apparatus.
6. **EXPERIMENTAL LABORATORY** PROFESSOR KAVANAUGH
Three credits First semester
Required of post senior M. E.; preparation: course 4.
Calibration of dynamometers and measurement of power. Testing lubricating value of oils. Tests of injectors and ejectors. Tests of steam-turbines, steam-engines and boilers, and complete power and lighting plants.
7. **EXPERIMENTAL LABORATORY** PROFESSOR KAVANAUGH
Two credits First semester
Required of post senior E. E. Preparation: courses, 8 mathematics and mechanics and 20 M. E.
Hydraulic measurements. Tests of water motors, rams, steam and power pumps. Measurement of power. Tests of gas and steam engines, boilers and complete power and lighting plants.

8. **EXPERIMENTAL LABORATORY** **PROFESSOR KAVANAUGH**
 Three credits **First semester**
 Elective for post seniors. Preparation: course 1. Tests of the properties of cements, concrete, and reinforced concrete. Strength of beams, columns, joints and framed structures.
9. **GAS ENGINE LABORATORY** **PROFESSOR KAVANAUGH**
 Three credits **Second semester**
 Required of post senior M. E. Preparation: courses 21 M. E. and 6 Ex. E. A continuation of course 6, also tests of gas, gasoline and hot-air engines, gas producers, air compressors, automobile and locomotive testing and special work.
10. **EXPERIMENTAL LABORATORY** **PROFESSOR KAVANAUGH**
 Two or four credits **Second semester**
 Elective for post seniors. Special research work and commercial tests.

FRENCH AND ITALIAN

FOR UNDERGRADUATES AND GRADUATES

5. **THE CLASSICAL PERIOD OF FRENCH LITERATURE** **PROFESSOR BENTON**
 Six credits (three hours per week) **Both semesters**
 Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.
 The reading of works and selections produced during the classical period of French literature and conversations in French concerning the same. The works of Corneille, Racine, Molière, La Fontaine, etc. Compositions.
6. **ADVANCED FRENCH CONVERSATION** **PROFESSOR BENTON**
 Four credits (two hours per week) **Both semesters**
 Open to those who have completed course 2 or course 3; both semesters must be completed before credit is given for the first semester.
 Conversations on French history, literature, the drama, etc.
7. **FRENCH LITERATURE OF THE NINETEENTH CENTURY** **PROFESSOR BENTON**
 Six credits (three hours per week) **Both semesters**
 Open to those who have completed course 2 or course 3 and course 5; both semesters must be completed before credit is given for the first semester.
 Lectures in French on the history of modern literature. Select works of some of the authors read and discussed. Compositions and essays.
8. **TEACHERS' COURSE IN FRENCH** **PROFESSOR BENTON**
 Two credits (one hour per week) **Both semesters**
 Open to those who have completed course five; both semesters must be completed before credit is given for the first semester.
 Special practice in pronunciation. Discussion in French of methods of teaching the French language and literature.
9. **ROMANCE PHILOLOGY** **PROFESSOR BENTON**
 Two credits (one hour per week) **Both semesters**
 Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.
 Lectures on the phonetical development of the French and other Romance languages from popular Latin. Reading of old French texts.
10. **ITALIAN LITERATURE** **PROFESSOR BENTON**
 Two credits (one hour per week) **Both semesters**
 Open to those who have completed course 5; both semesters must be completed before credit is given for the first semester.
 Edgren's *Italian Grammar*, Dante's *Divine Comedy*.
14. **ROMANCE LANGUAGES: OLD FRENCH** **PROFESSOR BENTON**
Both semesters
 Open to graduate students; other arrangements may be ascertained upon application to the department.
 Comparative phonetics and grammar of French and other romance languages. Some of the oldest monuments of the French language are studied

and the phonetic changes compared with modern French and English. Special attention is given to the period when French words came into the English language.

15. HISTORY OF FRENCH LITERATURE PROFESSOR BENTON
Two credits (one hour per week) Both semesters
Open to graduate students; both semesters must be completed before credit is given for the first semester.
A discussion of the evolution of the various schools and doctrines in French literature.
16. ITALIAN LITERATURE PROFESSOR BENTON
Two credits (one hour per week) Both semesters
Open only to graduate students who have completed course 5; both semesters must be completed before credit is given for the first semester.
History of Italian Literature, special: *The Divine Comedy*.

GEOLOGY

FOR UNDERGRADUATES AND GRADUATES

3. INDUSTRIAL GEOGRAPHY ASSISTANT PROFESSOR LEHNERTS
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed course 1 or 2.
The structural features of the North American continent outlined as an introduction. Following this is a study of the types of soil and dominating climatic characters of the several agricultural regions of the continent, a discussion of the geography of industries as they have grown up within the past 100 years and their dependence upon physiographic conditions; a study of local industries effected through excursions and reports. A brief survey of industries in other parts of the world parallels the more detailed study of North America. Throughout the course cause and effect are kept in view.
8. PALEONTOLOGY ASSISTANT PROFESSOR SARDESON
Six credits (three hours per week) Both semesters
Open to juniors and seniors who have taken or are taking courses in geology or biology.
The chief types of organisms as represented by fossils will be studied successively. The leading fossils and their phylogenetic history will be treated with considerable detail. Lectures and demonstrations.
9. PALEONTOLOGIC PRACTICE ASSISTANT PROFESSOR SARDESON
Six credits (three hours per week) Both semesters
Open to juniors and seniors who have completed course 8; may be taken by students pursuing courses in geology and biology in conjunction with course 7.
The collection, preparation, and study of materials, examination of collections, and reading will be carried on with a view to more complete knowledge of the groups of fossil organisms as presented in course 7.
11. PETROGRAPHY MR. GROUT
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed course 10.
The identification of rocks through the optical study of the component minerals; rock structures as seen under the microscope; alterations of rocks, and stratigraphic relations are studied. Preparation of material for study, its collection in the field, and an examination of some group of Minnesota crystalline rocks are features of the course. Laboratory, lectures, reference reading, and field work.
13. ORE DEPOSITS PROFESSOR HALL
Three credits (three hours per week) First semester
Open to seniors who have completed geology 1 and mineralogy 1.
History of mineral discovery and development in the Americas; a discussion of the origin and distribution of ore deposits, embracing the chemical processes involved in their formation and subsequent alterations; a description of the geology and mineralogy of ore bodies, particularly those yielding gold, silver, copper, iron, lead, and zinc.

14. SPECIAL PROBLEMS**PROFESSOR HALL**
Second semester

Two credits (two hours per week)

Open to seniors who have completed course 1 or 13.

The investigation by individual students of particular problems, involving the field work of an investigation of some particular formation and the laboratory investigation and reading incident to the study of the material collected. The methods of systematically recording and interpreting geological and mineralogical data as observed in the field, the keeping of note-books, and the preparation of geological maps, profiles, and sections will be taught.

FOR GRADUATES**18. PETROGRAPHICAL PROBLEMS****PROFESSOR HALL AND MR. GROUT**
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

A study of rocks as geological bodies; the genesis of rocks and their chemical and dynamical alterations, illustrated in the gneisses and gabbro schists of the Minnesota river valley or the granites and basic eruptives of central Minnesota.

19. THE KEWEENAWAN ERUPTIVES**PROFESSOR HALL AND MR. GROUT**
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

This course treats first, eastern and northwestern Minnesota, their stratigraphic relations, textural and structural characters; second, other problem in the Keweenawan to be selected on consultation.

20. GLACIAL GEOLOGY**PROFESSOR HALL**
Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

The local features of glacial phenomena. Field work will form the special feature of this course, embracing the formations at Minneapolis or some area accessible from it, as a survey of the glacial lakes in the vicinity, the gorge of the Falls of Saint Anthony, the Dalles of the Saint Croix, and other problems. The special field to be selected on consultation.

21. PALEONTOLOGIC GEOLOGY**ASSISTANT PROFESSOR SARDESON**

Three credits (three hours per week)

Open to graduate students who have completed courses 1, 6, and 8.

A study of the Ordovician fauna with special illustrations from the Ordovician of Minnesota and neighboring states.

22. ADVANCED PALEONTOLOGY**ASSISTANT PROFESSOR SARDESON**

Six credits (three hours per week)

Both semesters

Open to graduate students who have completed course 8.

The study of a selected group of fossils; a practical acquaintance with the forms and literature of the group is sought. The class work is to be supplemented by a thesis.

GERMAN**FOR UNDERGRADUATES AND GRADUATES****6. THE DRAMA****PROFESSOR SCHLENKER, ASSISTANT PROFESSORS****WILKIN AND JUERGENSEN, AND MR. BURKHARD**

Six credits (three hours per week)

Both semesters

Open to those who have taken courses 1 and 2, or course 4; both semesters must be completed before credit is given for the first semester. This course may be supplemented by course 8.

First semester: Modern drama. Play of Hebbel, Hauptmann, or Sudermann. Study of the present-day drama in Germany. Assigned readings and reports. Second semester: Classic drama. Play of Lessing, Goethe, or Schiller. Study of dramatic structure. History of the German drama in the eighteenth century.

9. **GERMAN LITERATURE OF THE CLASSIC PERIOD** PROFESSOR MOORE
 Six credits (three hours per week) Both semesters
 Open to those who have completed courses 1 and 2 (by special permission) or 3 and 7, or 4 and 6; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.
 First semester: Goethe's *Faust*; its genesis; the Faust legend; its treatment in literature before and since Goethe's time; plan of Goethe's *Faust*; solution of the Faust problem in part two. Lectures and collateral reading; essays by the class. Schiller's ballads, and other representative poems of this period. German versification. Second semester: Reading and discussion of Lessing's more important critiques, the *Laocoon*, and *Dramaturgie*.
10. **MODERN AUTHORS** PROFESSOR MOORE
 Six credits (three hours per week) Both semesters
 Open to those who have completed courses 1, 2, and 9 (by special permission), or 4, 6, and 9, or 3, 7, and 9; both semesters must be completed before credit is given for the first semester; required of those who obtain a teacher's recommendation in German.
 First semester: Romantic school and *Junge Deutschland*. Second semester: German literature since 1848.
12. **HISTORY AND LITERATURE OF THE REFORMATION** PROFESSOR MOORE
 Four credits (two hours per week) Both semesters
 Open to seniors and graduates who have completed course 9 or course 10; both semesters must be completed before credit is given the first semester.
 Brandt, Luther, Hutten, Sachs, Murner, and Fischart. Selections from Jansen and Egelhaaf.
13. **MIDDLE HIGH GERMAN** PROFESSOR SCHLENKER
 Four credits (two hours per week) Both semesters
 Open to seniors and graduates who have completed course 9 or course 10; both semesters must be completed before credit is given for the first semester.
 Study of the language and literature of the period. Paul's *Mittelhochdeutsche Grammatik*. Selected readings from *Armer Heinrich*, *Nibelungen Lied*, *Gudrun*, the poems of Walter von der Vogelweide, *Parsifal*, etc.
17. **HISTORY OF GERMAN LITERATURE** ASSISTANT PROFESSOR JUERGENSEN
 Four credits (two hours per week) Both semesters
 Open to seniors and graduates who have completed course 9; both semesters must be completed before credit is given for the first semester.
 Lectures in German on the history of German literature. Reviews and topical research on the part of the students.

FOR GRADUATES

14. **OLD HIGH GERMAN** PROFESSOR KLAEBER
 Four credits (two hours per week) Both semesters
 Open to seniors who have taken course 9 or course 10; both semesters must be completed before credit is given for the first semester.
 This course is identical with comparative philology 11.
15. **SEMINAR IN GERMAN DRAMA** PROFESSOR SCHLENKER
 Two credits (one hour per week) Both semesters
 Open to graduates and by permission of the department to undergraduates but without credit.
 An outline of the history of German dramatic literature from its beginning to and including the so-called classic drama. Assigned readings, reports, and discussions.
16. **THE GERMAN VOLKSLIED** MR. WILLIAMS
 Two credits (two hours per week) Second semester
 Open to graduate students who have completed course 9 or course 10.
 Outline of the history and development of the *Volkslied*. Study of selected numbers in Uhland's *Volkslieder* with references to other general and special collections. Influence of the *Volkslied* upon lyric and ballad writers.

18. **SEMINAR IN SCIENTIFIC READING** **ASSISTANT PROFESSOR JUERGENSEN**
 Four credits (two hours per week) **Both semesters**
 Open to graduate students who have completed course 9 or 10,
 and (by permission of the department) to undergraduates who
 have completed course 9 or 10; both semesters must be com-
 pleted before credit is given for the first semester.
 1908-9 The literature of evolution (Haeckel, Reinke, etc.)
 1909-10 Chemistry and physics (Ostwald, Helmholtz, etc.)
 1910-11 Psychology and philosophy (especially Wundt.)
 For courses in Germanic philology see the statement of the department
 of comparative philology.

GREEK**FOR GRADUATES**

18. **SEMINAR IN GREEK TRAGEDY** **PROFESSOR BROOKS**
 One credit (one hour per week) **Second semester**
 Open to juniors and seniors who have completed course 5.
19. **ADVANCED COURSE IN EPIC POETRY** **PROFESSOR HUTCHINSON**
 Open to graduate students only; other arrangements may be
 ascertained upon application to the department.
20. **ADVANCED COURSE IN GREEK DRAMATIC POETRY** **PROFESSOR BROOKS**
 Open to graduate students only; other arrangements may be
 ascertained upon application to the department.
21. **ADVANCED COURSE IN GREEK ORATORY** **ASSISTANT PROFESSOR SAVAGE**
 Open to graduate students only; other arrangements may be
 ascertained upon application to the department.
22. **LATER GREEK (322 B. C. to 200 A. D.)** **PROFESSOR HUTCHINSON**
 Open to graduate students only; other arrangements may be
 ascertained upon application to the department.
23. **ADVANCED COURSE IN MODERN GREEK** **PROFESSOR BROOKS**
 Open to graduate students only; other arrangements may be
 ascertained upon application to the department.

HISTOLOGY AND EMBRYOLOGY**FOR UNDERGRADUATES AND GRADUATES**

1. **GENERAL VERTEBRATE MORPHOLOGY AND HISTOLOGY**
PROFESSOR LEE, ASSISTANT PROFESSOR NICKERSON
 Four and one-half credits (six lectures and recitations, three
 laboratory periods) **First quarter**
2. **MICROSCOPIC ANATOMY OF MAN AND VERTEBRATES**
PROFESSOR LEE, ASSISTANT PROFESSOR NICKERSON
 Four and one-half credits (six lectures and recitations, three
 laboratory periods) **Second quarter**
3. **MICRO-TECHNIQUE AND THE MORPHOLOGY OF THE SPECIAL SENSE**
ORGANS **PROFESSOR LEE**
 Four and one-half credits (six lectures and recitations, three
 laboratory periods) **Third quarter**
7. **CYTOLOGY AND HISTOGENESIS** **PROFESSOR LEE**
 Two credits (four lectures and recitations, two laboratory
 periods) **Third quarter**
 Prerequisite courses 3 and 13 or equivalent.
10. **RESEARCH WORK IN HUMAN AND VERTEBRATE MORPHOLOGY**
PROFESSOR LEE
 Properly qualified students will be provided every facility for
 original investigation of anatomical problems.
11. **ELEMENTS OF VERTEBRATE EMBRYOLOGY** **PROFESSOR LEE,**
ASSOCIATE PROFESSOR JOHNSTON
 Four and one-half credits (six lectures and recitations, three lab-
 oratory periods) **First quarter**

12. **ADVANCED VERTEBRATE EMBRYOLOGY** PROFESSOR LEE,
ASSOCIATE PROFESSOR JOHNSTON
Three credits (six lectures and recitations, three laboratory
periods) Second quarter
13. **SPECIAL EMBRYOLOGY OF MAN AND VERTEBRATES** PROFESSOR LEE
Four and one-half credits (six lectures and recitations, three
laboratory periods) Third quarter
17. **EXPERIMENTAL EMBRYOLOGY** PROFESSOR LEE
Two credits (four lectures and recitations, two laboratory
periods) Fourth quarter
Prerequisite courses 3 and 13 or equivalent.
20. **THE ANIMAL PARASITES OF MAN** ASSISTANT PROFESSOR NICKERSON
One credit (hours to be arranged) Third quarter
21. **ELEMENTS OF MAMMALIAN NEUROLOGY** ASSOCIATE PROFESSOR
JOHNSTON, DR. INGBERT
Three credits (two lectures and recitations, one laboratory
period) Second quarter
22. **THE HUMAN NERVOUS SYSTEM** ASSOCIATE PROFESSOR JOHNSTON
DR. INGBERT
Four and one-half credits (six lectures and recitations, three
laboratory periods) First quarter
23. **SPECIAL AND APPLIED NEUROLOGY** ASSOCIATE PROFESSOR JOHNSTON
DR. INGBERT
One credit (hours to be arranged) Fourth quarter
24. **NEUROLOGICAL TECHNIQUE** ASSOCIATE PROFESSOR JOHNSTON
Two credits (hours to be arranged) Fourth quarter
26. **THE NERVOUS SYSTEM AND MENTAL LIFE** ASSOCIATE PROFESSOR JOHNSTON
One credit (hours to be arranged) Second quarter
27. **COMPARATIVE NEUROLOGY OF VERTEBRATES** ASSOCIATE PROFESSOR JOHNSTON
One to three credits (hours to be arranged) Second quarter
Intended for graduates; open by special permission to seniors
who meet the requirements. Prerequisite courses 1 and 2, or 3
in Animal Biology, or courses 2 and 12 in Histology and
Embryology.
30. **RESEARCH IN NEUROLOGY** ASSOCIATE PROFESSOR JOHNSTON
Problems and special work in vertebrate Neurology. Open only
to those who are qualified to carry on investigation.
40. **ANATOMICAL JOURNAL CLUB AND SEMINAR**
Weekly meetings during year for reviews of the current literature
and discussion of special topics in Anatomy, Histology, Em-
bryology and Neurology, and of the research work being car-
ried on in the department. The department library, which is
large and rapidly growing, receives all the leading anatomical
journals.

HISTORY

FACILITIES

The department of history is equipped with library material for "practice courses" in research in American History, especially the colonial and revolutionary periods, in English and French medieval history, in the French Revolution, and in certain phases of European Nineteenth Century history. Valuable additions to the University resources in some of these lines are to be found in the excellent library of the State Historical Society, and in the State Library at the Capitol in St. Paul (thirty minutes distant), and in the City and Athenaeum libraries in Minneapolis.

In none of the lines mentioned, however, is the department satisfactorily prepared to give more than two years of graduate work, with due regard for economy of the student's time and energy. Therefore, if a student desires to take his doctorate in history here, he must be prepared, until the library facilities are materially improved, to do at least a third of his work in libraries elsewhere, under direction of the department.

COURSES OF INSTRUCTION

The following are "general courses" (lectures and reading, with study of selected documents and some research work). They are open to upper classmen in the undergraduate college who have completed one or two elementary courses there; and they may be taken as minors, or parts of minors, for the master's degree. Any one of them may be taken, also, for part of a major towards the master's degree, provided, (1) that the applicant has made large general preparation in other fields of history, and, (2) that the course chosen be accompanied by sufficient work in more intensive courses in the same field. Thus if an applicant is well prepared in European history, including English constitutional history, but has had little American history, he might be allowed a major in 5 followed by two, three, or four courses selected from 7-14.

FOR UNDERGRADUATES AND GRADUATES

3. THE RENAISSANCE AND REFORMATION PROFESSOR WHITE
 Three credits (three hours per week) First semester

Open to those who have completed course 1 or course 2.

The Renaissance and Reformation will be studied as general European movements, with the emphasis upon the work of individual men and upon ideas rather than upon politics and institutions. The purpose of the course will be to show how the medieval world became the modern world.

4. EUROPE SINCE 1789 PROFESSOR ANDERSON
 Six credits (three hours per week) Both semesters

Open to those who have completed course 1 or 2.

The history of France occupies the most prominent place in the course, that of other countries being grouped about it, as far as possible. Much attention is given to international affairs, the principal territorial changes being illustrated with a series of wall maps prepared for the course under the direction of the instructor. A special effort is made to put the students into a position to understand the present governments and politics of the leading European states. The entire class meets twice each week for lectures or recitations. The third exercise is devoted to the study of important historical documents, drawn principally from Anderson's *Constitutions and other Select Documents Illustrative of the History of France 1789-1901*. This work is done in small groups which meet in the European history seminar room.

5. AMERICAN CONSTITUTIONAL HISTORY TO 1840 PROFESSOR WEST
 Six credits (three hours per week) Both semesters

Open to those who have completed course 2; required for courses 6 to 9 inclusive, 11, 13, 14, and 19, and therefore to students who intend to specialize in history recommended for the sophomore year.

The aim is to make this a "practice course"; the work is done partly by co-operative topical reports, and students are expected to consult primary sources to a greater degree than is possible in most undergraduate courses. During part of the year the class will meet once a week in small sections for the study of documents.

6. AMERICAN CONSTITUTIONAL HISTORY, 1841-1885 PROFESSOR WEST
 Three credits (three hours per week) Second semester

Open to those who have completed course 2 and at least the first semester of course 5; given in 1908-9, and in alternate years thereafter.

Special attention is given to the development of the slavery issue in politics, the political history of the civil war, and reconstruction.

15. HISTORICAL METHOD AND BIBLIOGRAPHY PROFESSOR WHITE
 Two credits (two hours per week) Second semester

Open to those who have completed course 1 or course 2, but designed only for those who intend to specialize in history.

This course aims to make clear to the student the genesis of the modern historical method and to introduce him in a practical way to the use of the best tools in historical study. The work divides naturally as follows:

1. Exercises in historical criticism and interpretation. One or more important historical sources will be studied intensively by the class.
2. History of historical writings; especially the work of Ranke and his followers and the origin of the seminar system. Some account will be taken of present methods and advantages of study in Germany and France.

helps to historical study, such as standard bibliographies, historical magazines, source material, etc.

While the knowledge of Latin or the modern languages is an advantage, it is not a necessity in this course.

20. ENGLAND SINCE 1815

PROFESSOR ANDERSON

Three credits (three hours per week)

Second semester

Open to those who have completed course 2; may be taken to advantage in connection with course 4; not given in 1908-9.

The course opens with a rapid survey from the point where course 1 stops down to 1815. From there on the work is more intensive. Through topics and assigned readings an opportunity is afforded to become acquainted with the principal British reviews and with two or three of the leading British newspapers.

21. HISTORY OF GREECE

ASSISTANT PROFESSOR WESTERMANN

Three credits (three hours per week)

First semester

Open to those who have completed course 1 or course 2.

The course is general in its nature and will cover the political and social development of the Greek states to the time of their incorporation into the Roman Empire, with particular emphasis upon the later part of the period. Especial attention will be given to the permanent influence of Greek civilization.

FOR GRADUATES

The following courses are "intensive" or "advanced" courses. Each one of them requires the completion of the corresponding "general" course in the list above. They may be taken, in proper combination, for majors for the master's degree, or, by ones or twos, for minors.

7. THE MAKING OF THE CONSTITUTION

PROFESSOR WEST

Six credits (three hours per week)

Both semesters

Open to juniors, seniors, and graduates, who have completed course 5, but only on approval of the instructor; both semesters must be completed before credit is given for the first semester.

Each member of the class studies in detail the transition in one of the original American colonies to commonwealth government, with the constitution of his chosen state. The work of the Philadelphia convention is then taken up and the accounts of later writers are compared with the sources. "We the people," the "compact" theory, and the province of the Supreme Court as "final arbiter," are topics especially investigated, with such further aids as the writings of the day and the discussions of the ratifying state conventions afford. Besides the class work each student will present a written report upon the history of some important bill providing for the admission of a state, and some constitutional question in connection with congressional legislation.

8. AMERICAN HISTORY SINCE 1789 AS SHOWN IN THE DEVELOPMENT OF CONSTITUTIONAL LAW

PROFESSOR WEST

Three credits (three hours per week)

First semester

Open to seniors and graduate students who have completed courses 2, 5, 6, and 7; not given in 1908-9.

This course is not designed to be a systematic treatment of either history or constitutional law. It consists of a careful analysis of cases selected from *Thayer's Cases on Constitutional Law*, studied in their historical setting and with reference to the course of development.

9. STUDIES IN AMERICAN STATESMEN

PROFESSOR ANDERSON

Three credits (three hours per week)

Second semester

Open to juniors, seniors, and graduate students, who have completed course 2 and at least the first semester of course 5.

A research course. Each member of the class makes a study of some prominent American statesman who has left a considerable body of materials valuable for information upon his own career and the general history of the United States. The greater part of the work consists in the sifting of these materials and the preparation of brief reports in regard to points assigned for investigation. The class exercises are chiefly devoted to the criticism of these reports and the synthesis of the results thus obtained. Only a limited period is traversed. In 1908-9 the work will be confined to the period of the Federalist supremacy, 1789-1801.

10. **A CRITICAL STUDY OF A HISTORICAL MASTERPIECE** PROFESSOR ANDERSON
Three credits (three hours per week) First semester

Open to those who have completed course 5.
The object of this course is to develop the habit of reading history critically. Each year a masterpiece of historical literature will be minutely and critically studied. Each student will be required to read critically the entire work studied and, in addition, to analyze and report upon assigned portions of it. These reports will be made the basis of the class work, which will consist mainly of discussions carried on by the students under the direction of the instructor. In 1908-9 Rhodes' *History of the United States from the Compromise of 1850 to the Restoration of Home Rule in the South in 1877* will be read.

11. **THE HISTORY OF AMERICAN DIPLOMACY** PROFESSOR ANDERSON
Three credits (three hours per week) First semester

Open to seniors and graduates who have completed course 5.
A research course dealing principally with the more important features of American foreign policy during the earlier years of the federal government.

12. **THE HISTORY OF EUROPEAN DIPLOMACY SINCE 1789** PROFESSOR ANDERSON
Three credits (three hours per week) Second semester

Open to seniors and graduates who have completed or are taking course 4; ability to read easy French is required.
This course centers about the critical reading of the principal treaties and numerous state papers dealing with international relations.

13. **COLONIAL EXPANSION AND ADMINISTRATION** PROFESSOR WEST
Three credits (three hours per week) Second semester

Open to seniors and graduates who have completed course 4 or course 5; given in alternate years; not offered in 1908-9.
The history of the colonial acquisitions of the great nations will be surveyed rapidly and colonial institutions and governments will be studied and compared in detail.

14. **A CRITICAL STUDY OF AUTHORITIES FOR EARLY NEW ENGLAND HISTORY** PROFESSOR WEST
Four credits (two hours per week) Both semesters

Open to seniors and graduates who have completed eighteen credits, including course 5; both semesters must be completed before credit is given for the first semester; given in alternate years.
This is primarily a course in historical criticism, based on a minute study of Winthrop's *History of New England*. Each member of the seminar has a group of secondary authorities assigned him which he is to criticize in the light of the original sources. The study involves also a careful comparison of the chief sources with one another, and incidentally it leads to a minute treatment of political, social, and economic development in early New England. The number admitted to the course is limited to seven.

18. **ORIGIN OF THE ENGLISH JUDICIAL SYSTEM** PROFESSOR WHITE
Three credits (three hours per week) Second semester

Open to juniors, seniors, and graduates, who have completed six credits, including course 2, and obtain the permission of the instructor; students must be able to read medieval Latin, and course 9 in the Latin department is recommended to give this preparation.
The work will consist of detailed study in the sources of the twelfth and thirteenth centuries, and will aim to show how the kings' court, from which the present judicial system has grown, superseded the older communal and private courts, the development of the primitive king's court into a system of courts, and the growth in it of a new procedure. In this last connection the critical stages in the early history of the jury will receive special attention.

19. **THE EXPANSION OF AMERICA, STUDIED IN ITS HIGHWAYS OF EMIGRATION** Both semesters
Six credits (three hours per week)

Open to seniors and graduates who have completed course 5; both semesters must be completed before credit is given for the first semester; not given in 1908-9.
This is a study of roads and methods of pioneer travel in that westward movement of population which extended the inhabited area of the United States from the seaboard to the Mississippi.

22. **GREEK POLITICAL INSTITUTIONS** ASSISTANT PROFESSOR WESTERMANN
 Three credits (three hours per week) Second semester
 Open to juniors, seniors, and graduates, who have completed
 courses 1 or 2, 21, and six additional credits.

A study of the development of Greek political forms and of their operation as seen in typical oligarchic, democratic, federal, and monarchic states.

23. **ROMAN IMPERIAL ORGANIZATION** ASSISTANT PROFESSOR WESTERMANN
 Three credits (three hours per week) Second semester
 Open to juniors, seniors, and graduates, who have completed
 twelve credits.

This course will survey the development and organization of the imperial system from the beginning of Roman expansion outside of Italy to the time of the Germanic invasion. Special attention will be given to the administration of the municipalities and provinces under the Empire and to the development of despotism.

HORTICULTURE

Equipment. The library of the division of horticulture is well equipped with literature and periodicals devoted to this subject, all of which are well indexed. The campus, orchards, nurseries, fruit gardens and greenhouses at the University farm afford good illustrations and opportunities for study and experiment work. The new fruit breeding farm offers the best of facilities for the study of this important line of work.

Graduate work is offered to those who are prepared to pursue it to advantage. Two courses are offered but others will be given if conditions seem to make it desirable.

1. **GENERAL POMOLOGY** PROFESSOR GREEN
 A general course in the study of cultivated fruits.
2. **PLANT BREEDING** PROFESSOR GREEN
 A general course in the study of the origin and development of
 cultivated varieties.

LATIN

FOR UNDERGRADUATES AND GRADUATES

6. **ADVANCED COURSE IN CAESAR** PROFESSOR PIKE
 Three credits (three hours per week) First semester
 Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.
 Selections from books five to seven of the Gallic War and from the Civil War. Thorough study of the principles of indirect discourse. Intermediate Latin composition. An amount of time approximately equal to one hour for one-half semester will be spent upon the technical portions of the work, e. g., class drill work and discussion of various problems connected with secondary school work in Latin.
7. **ADVANCED COURSE IN VIRGIL** PROFESSOR PIKE
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 1 to 4 inclusive; required for a teacher's recommendation in Latin.
 An interpretation of selections from books seven and twelve of the Aeneid; a study of the quantitative method of pronouncing Latin verse; practice in the metrical rendering of selected passages. An amount of time approximately equal to one hour for one-half semester will be spent upon the strictly technical portions of the subject.
8. **PLINY'S LETTERS** PROFESSOR PIKE
 Two credits (two hours per week) First semester
 Open to those who have completed courses 1 to 4 inclusive.
 Selections from the correspondence of Pliny the Younger with a study of his times.
10. **LATIN COMPOSITION** PROFESSOR PIKE
 Two credits (two hours per week) Second semester
 Open to those who have completed course 1 to 4 inclusive.
 A course in advanced Latin composition and a study of Latin prose style.

11. **ROMAN ELEGIAC POETRY** PROFESSOR CLARK
 Three credits (three hours per week)
 Open to those who have completed courses 1 to 4 inclusive.
 Selections from Catullus, Tibullus, Propertius, and Ovid, with a study of the rise, development, and characteristics of Roman elegiac poetry.
12. **CORRESPONDENCE OF CICERO** PROFESSOR CLARK
 Two credits (two hours per week) First semester
 Open to those who have completed courses 1 to 4 inclusive.
 Selections from the letters of Cicero, with a study of his life and the history of his times.
13. **ROMAN SATIRE** PROFESSOR CLARK
 Three credits (three hours per week) Second semester
 Open to those who have completed courses 1 to 4 inclusive.
 Selections from Juvenal, Persius, Horace, and from early satire, with a study of the rise, development, and characteristics of Roman satire.
 Courses 6 and 7 are open as minors only on permission of the professor in charge.

FOR GRADUATES

17. **LUCRETIVS** PROFESSOR CLARK
 Three credits (two hours per week) Both semesters
 Open to graduate students; other arrangements may be ascertained upon application to the department.
 The course consists of the reading and interpretation of the text of Lucretius with a study of his philosophy and its sources.
18. **SENECA** PROFESSOR PIKE
 Three credits (two hours per week) Both semesters
 Open to graduate students; other arrangements may be ascertained upon application to the department.
 Reading, interpretation and annotation of the *de Beneficiis* of Seneca with a study of Stoicism at Rome.
19. **THE HISTORY AND THEORY OF ROMAN ELOQUENCE** ASSISTANT PROFESSOR GRANRUD
 Three credits (two hours per week) Both semesters
 Open to graduate students; other arrangements may be ascertained upon application to the department.
 The *Brutus* of Cicero will form the basis of the work during the first semester and the *Orator* during the second semester.

LAW

FIRST GRADUATE COURSE

1. **PHILOSOPHIC BASIS OF JURISPRUDENCE** DEAN PATTEE
 For the degree of Master of Laws. This course constitutes an inquiry into the nature of law in its most general signification. It considers the truths of reason, the "laws of nature," so-called, and the positive law or jurisprudence. It considers the nature of international and municipal law, and illustrates by means of judicial authorities how the primary truths of reason operate in the realm of human law.
2. **SCIENCE OF THE STATE**
 This course considers the segregation from the comprehending science of politics, and the co-ordinate sciences of government and jurisprudence. The citizen and subject population; the territory, its existence and content, subdivisions, relation of people to the land, comparison of great and small states; theories of the state; liberty and opportunity as the ends of the state; the state as the organ of power, and guardian of rights; the essentia of constitutions.
3. **CONSTITUTIONAL HISTORY AND JURISPRUDENCE.**
 This course is devoted to a critical study of the "dual system" of constitutional government of which the American Republic is the conspicuous example. The Federal constitution and the State constitutions are illustrated separately in both their historical and their legal aspects, as distinct parts of one system, but which are designed to work harmoniously in unison, and are

both necessary to the successful operation of the system. The Federal courts are shown to have so conducted the administration of their high duties as to have contributed to the proper development of the State side of the system, and to have made the Federal Government the firm bulwark of local self-government in the States.

Those who enter this course as candidates for the degree must have already received the degree of bachelor of laws, from this or some other law college having a three years course of study. Those who spend the entire year in the work prescribed for this course, and pass a satisfactory examination upon the subjects taken, will be entitled to the degree of master of laws.

But no graduate of another law school, who has not been admitted to the bar of Minnesota, will be matriculated in this course as a regular student for the degree of LL. M.; but any person who possesses the requisite legal learning may enter the course as a special student and pursue any or all of the studies offered.

SECOND GRADUATE COURSE

Students who have received the degree of LL. B., from this or some other law school requiring three years' study of law for said degree, and who have also received the degree of LL. M., from this or some other school after not less than one year of graduate study, and who have taken high rank in all the studies leading to these degrees, may apply to the faculty for the degree of Doctor of Civil Law. A knowledge of French or German, as well as of Latin is required, and special proficiency in Roman history is necessary to entitle a student to candidacy for such degree.

There is no prescribed time within which students are required to do their work in this course, but they must make themselves proficient in the subjects of Roman law, political science, comparative constitutional law, and the philosophy of jurisprudence before any thesis will be accepted from them.

None of the aforementioned degrees will be conferred until a satisfactory thesis is presented to the faculty by the student, and the thesis for the doctor's degree must be one evincing original investigation and special excellence.

Whether a class will be organized in this course during the current academic year will depend upon the number of applicants for admission.

MATHEMATICS

FOR UNDERGRADUATES AND GRADUATES

10. DIFFERENTIAL EQUATIONS PROFESSOR DOWNEY
Three credits (three hours per week) Second semester
Open to those who have completed courses 3 to 7 inclusive.
Text and lectures.
11. ADVANCED COURSE IN PLANE ANALYTICAL GEOMETRY PROFESSOR BAUER
Three credits (three hours per week) First semester
Open to those who have completed courses 3 to 6 inclusive.
Supplementary to course 5, treating more fully some of the subjects of that course and taking up additional subjects.
12. SOLID ANALYTICAL GEOMETRY PROFESSOR BAUER
Three credits (three hours per week) Second semester
Open to those who have completed courses 3 to 8 inclusive.
A lecture course. Elementary theorems of projection, co-ordinates, the plane, the line in space, quadric surfaces, transformation of co-ordinates, tangents, poles and polars, the general equation of the second degree. Numerous examples are assigned to illustrate the theory.
14. METHOD OF LEAST SQUARES PROFESSOR LEAVENWORTH
Two credits (two hours per week) Second semester
Open to those who have completed courses 3 to 7 inclusive.
A study of the combination and adjustment of observations and the discussion of their precision as applied especially to engineering physics, and astronomy.
16. ADVANCED DIFFERENTIAL AND INTEGRAL CALCULUS PROFESSOR DOWNEY
Four credits (two hours per week) Both semesters
Open to graduate students who have completed courses 3 to 7 inclusive.
This course goes farther into some of the subjects treated in courses 6 and 7 and takes up some important subjects not included in those courses.

17. **THEORY OF CURVES AND SURFACES** PROFESSOR BAUER
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 7 inclusive and 10 and 12.
 This is a course in differential geometry. The fundamental equations of the theory of curves and of surfaces will be developed. The work will be based upon Scheffer's *Theorie der Curven und Flaechen*.
18. **THE GALOIS THEORY OF EQUATIONS** ASSISTANT PROFESSOR BUSSEY
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 9 inclusive.
19. **THEORY OF FUNCTIONS OF A COMPLEX VARIABLE** DR. MANCHESTER
 OR MR. DALAKER
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 1 to 10 inclusive.
 Lectures, readings, and problems.
20. **PROJECTIVE GEOMETRY** ASSISTANT PROFESSOR BUSSEY
 Four credits (two hours per week) Both semesters
 Open to graduate students who have completed courses 3 to 7 inclusive and courses 11 and 12.

MATHEMATICS AND MECHANICS

FOR GRADUATES AND UNDERGRADUATES

15. **DESCRIPTIVE GEOMETRY** PROFESSOR KIRCHNER
 Four credits (two hours per week) Both semesters
 Open to those who have completed courses in drawing 3 to 5 inclusive; both semesters must be completed before credit is given for the first semester.
 Problems relating to points, lines, planes, solids, surfaces of revolution and warped surfaces; orthographic, isometric, horizontal, oblique, and perspective projections; shades and shadows. Recitations, lectures, and practice.
- 7'. **STRENGTH AND RESISTANCE OF MATERIALS** PROFESSOR EDDY
 Five credits (five hours per week)
 Required of all juniors in the civil engineering course. Before registration for this course the student must pass the required physics of sophomore year in addition to the required mathematics of the two preceding years. Bars, beams, shafts, columns, reinforced concrete, hollow cylinders and spheres, rollers, and plates and the general theory of internal stress.
- 7a'. **APPLIED MECHANICS** PROFESSOR BROOKS, ASSISTANT PROFESSOR NEWKIRK
 Five credits (five hours per week) First semester
 Required of all juniors in the mechanical and electrical engineering courses. Prerequisites the same as course 7. The principles of statics and dynamics, and the mechanics of the materials of construction.
- 8'. **HYDRAULICS AND PUMPING MACHINERY** PROFESSOR EDDY, PROFESSOR BROOKE, ASSISTANT PROFESSOR NEWKIRK
 Five credits (five hours per week) Second semester
 Required of all juniors. Prerequisite course 7 or 7a. Laws of the equilibrium, pressure and flow of liquids; theory of the action of pumps, compression and flow of gases.
- 9'. **THERMODYNAMICS OF STEAM AND GAS ENGINES** PROFESSOR EDDY
 Three credits (three hours per week) First semester
 Required of all candidates for degrees in mechanical and electrical engineering. Prerequisite, course 8'. The mechanical theory of heat as applied to steam, oil, gas and hot air engines and to compressors, including the use of steam tables, entropy diagrams, etc.

- 10'. **WATER TURBINES** PROFESSOR EDDY
Two credits (two hours per week) First semester
Required of all candidates for degrees in mechanical and electrical engineering, except those who elect either railway engineering or telephony. Theory of the operation, construction and regulation of turbine wheels.
- 11'. **STEAM TURBINES** PROFESSOR EDDY
Two credits (two hours per week) Second semester
Open to all who have had courses 9 and 10 Various types of turbines, velocity, impulse and reaction; nozzles, vanes, discs, bearings, governors, thermodynamic analysis and efficiency.
- 12'. **REFRIGERATING MACHINERY** PROFESSOR EDDY
(Two credits, two hours per week) Second semester

FOR GRADUATES

26. **PERSPECTIVE** PROFESSOR KIRCHNER
Three credits (three times per week)
The principles and practice of perspective, including shadows, reflections, distortions, corrections, systems, methods, the practical problem, and inverse constructions.
27. **HISTORY OF MATHEMATICS** PROFESSOR HAYNES
Two credits (twice per week)
Lectures and reading, under direction of works in the mathematical library on the ancient and modern development of mathematics.
28. **ELLIPTIC INTEGRALS** ASSISTANT PROFESSOR BROOKE
Four credits (two hours per week) Both semesters
Courses in the following related subjects in mathematics, mathematical physics and theoretical mechanics are open to those who have had sufficient preparation.
13. **DIFFERENTIAL EQUATIONS.**
14. **ANALYTICAL STATICS AND POTENTIAL FUNCTIONS.**
15. **SPHERICAL HARMONICS.**
16. **THEORY OF ELECTRICITY AND MAGNETISM.**
17. **ANALYTICAL THEORY OF THE CONDUCTION OF HEAT.**
18. **THEORY OF ELASTICITY AND SOUND.**
19. **ELECTRO-MAGNETIC THEORY OF LIGHT.**
20. **HYDRODYNAMICS AND FLUID MOTION.**
21. **DYNAMICS OF RIGID BODIES.**
22. **ELLIPTIC FUNCTIONS.**
23. **THEORY OF FUNCTIONS OF THE COMPLEX VARIABLE.**
24. **DIRECTIONAL CALCULUS, VECTOR ANALYSIS, DETERMINANTS**
25. **KINETIC THEORY OF GASES.**

MECHANICAL ENGINEERING

FOR UNDERGRADUATES AND GRADUATES

9. **SHOP ECONOMICS** PROFESSOR FLATHER
Two credits (two hours per week) Second semester
Senior elective.
Shop and factory organization and management; cost systems.
13. **MACHINE DESIGN** PROFESSOR FLATHER AND MR. MARTENIS
Five credits (ten hours per week) First semester

14. **MACHINE DESIGN** PROFESSOR FLATHER, MR. MARTENIS
 Three credits (six hours per week) Second semester
 Required of seniors, M. E. course. Open only to those pursuing course 20.
 Continuation of course 13. Rope driving; bevel gears, spiral gears. Also application of graphical methods to the design of valve gears and link motions. Zeuner diagrams, indicator cards. Lectures and drawing-room practice.
15. **MACHINE DESIGN** PROFESSOR FLATHER
 Four credits (eight hours per week) First semester
 Required post senior year, M. E. course. Preparation: courses 14 and 19.
 Steam engine. Calculations and working drawings for a high speed automatic steam engine. Theoretical diagrams and determination of details.
 Gas engine. An alternative course in gas engine design is offered those who have completed course 21.
16. **MACHINE DESIGN** PROFESSOR FLATHER
 Four credits (eight hours per week) Second semester
 Required, post senior year, M. E. course. Preparation: course 13.
 Original designing, including machinery for changing size and form. Boiler design, cranes, pumping and transmission machinery and engineering appliances. Lectures, problems and drawing-room practice.
17. **TOOL DESIGN** PROFESSOR FLATHER
 Two to four credits (four or eight hours per week) First or second semester
 Elective. Preparation: courses 6, 13.
 Design of special tools for manufacturing interchangeable parts; jigs and milling fixtures.
18. **ENGINEERING DESIGN** PROFESSOR FLATHER
 Two or four credits (four or eight hours per week) First or second semester
 Elective. Preparation: courses 19, 20.
 Problems, designs and estimates for power plants, central stations and factory equipment. Selection of motive powers, relative advantages of steam and producer gas plants; choice of engines and boilers; water powers; power distribution, dynamos and motors; pumps, shafting, piping and accessory plant.
19. **STEAM BOILERS** MR. SHOOP
 One credit (one hour per week) First semester
 Senior year. Open only to students pursuing course M. 7.
 Application of theory and practice in the design and construction of steam boilers, chimneys, boiler settings, and accessories, smoke prevention, mechanical stokers; methods of operating boilers with safety and economy.
20. **STEAM ENGINE** PROFESSOR FLATHER
 Three credits (three hours per week) Second semester
 Senior year, preparation: course 7 M.
 Mechanics of the steam engine. Work in the cylinder; effect of reciprocating parts; steam distribution. Mechanism of the steam engine. A study of the details of modern steam engines, valves and valve gears. A study of the slide valve, link motions, and other reversing gear; automatic cut-off gears and the Zeuner diagram. The steam engine indicator. Principles and operation of the instrument, indicator rigging; indicator cards; compounding.
21. **GAS ENGINES AND PRODUCERS** MR. SHOOP
 Two credits, (two hours per week) Second semester
 Senior year. Open only to students pursuing course C. 6.
 Principles of operation of two cycle and four cycle engines; cylinder construction and arrangement; valve gears and starting mechanisms; system of speed control, ignition and cooling. Application of the indicator and consideration of indicator diagrams.

A study of the power gas producer including suction and pressure types for various fuels; construction and operation of the generator and accessory apparatus. Application to various industrial purposes. Recitations and lectures.

22. **MECHANICAL ENGINEERING** PROFESSOR FLATHER
 Two credits (two hours per week) First semester
 Post senior, preparation: course 8 M.
MEASUREMENT OF POWER. A study of the methods employed in measuring power. Dynamometers. Prony brakes; measurement of water power; water meters; weir measurement, flow of water in pipes; measurement of electric power, efficiency of motors, power required to drive machine tools and shafting. Recitations and lectures.
 Two credits (two hours per week) Second semester
 Preparation: course M. 8.
 Air compressors and motors, and the transmission of power by compressed air. Recitations and lectures.

23. **MECHANICAL ENGINEERING** MR. MARTENIS
 Three credits (six hours per week) First semester
 Elective. Post senior year.
 Heating and ventilation. Principles of heating and ventilation. Construction and operation of heating apparatus. Steam, hot water, exhaust, vacuum and fan systems. Lectures, recitations and design.
SEMINAR. Open to the seniors and post seniors once a week.

The following courses are available to students desiring to prepare themselves for special work in railway engineering.

24. **RAILWAY TECHNOLOGY** MR. MARTENIS
 Two credits (four hours per week) First semester
 Post senior. Railway M. E. course.
 The object of this course is to familiarize the student with the principal details of construction of locomotives, and consists in part of a systematic course of visits to the various railroad shops in the vicinity; lectures and recitations.
25. **RAILWAY DESIGN** PROFESSOR FLATHER
 Four credits (eight hours per week) First and second semesters
 Post senior. Preparation: course 24.
 (a) Of link and valve motions. Continuation of course 12 with special applications of the Stephenson link.
 (b) Of locomotive and car details.
 (c) Of the locomotive boiler.
 (d) Of assembled parts.
26. **LOCOMOTIVE CONSTRUCTION** PROFESSOR FLATHER
 Two credits (two hours per week) Second semester
 Post senior. Preparation: course 24.
 Lectures, reading and recitations on design and construction of locomotives, supplementing course 24. This treats:
 (a) Of parts not involving the boiler and the use of steam; but including the carriage, as frames, springs and equalizing arrangements, running gear, brakes, trucks, lubrication.
 (b) Of locomotive boilers and connected parts. Types, proportions, grates, flues, smoke-box arrangements and stacks, riveted joints, bracing and staying. Lagging, smoke prevention.
 (c) Of the locomotive engine. Details, heat insulation, cylinder proportion for various types, weight on drivers, special service; crank effort diagrams with inertia of reciprocating parts, cylinder and receiver ratios for compound engines, starting valves for compounds.
27. **LOCOMOTIVE ROAD TESTING** PROFESSOR FLATHER
Second semester
 Post senior.

28. SPECIFICATIONS

One credit (one hour per week)

Post senior year, M. E. course.

A study of engineering specifications. Classes of specifications; essential features; clauses; details. Examples. Lectures, recitations and practice in writing specifications.

PROFESSOR FLAT ~~HER~~
Second seme~~ster~~

FOR GRADUATES.

Courses are offered in:

Engineering design.

Experimental investigation.

Railway engineering.

MINERALOGY

FOR UNDERGRADUATES AND GRADUATES

4. OPTICAL MINERALOGY

Three credits (six hours per week)

Open to juniors and seniors who have completed course 1.

A study of the microscopic structure of crystals and crystal grains. An application of methods used in determining minerals by their optical properties; goniometric and stauroscopic practice, embracing the elements of lithology. Lectures and laboratory work.

MR. GROUT
Second semester

5. THE MORPHOLOGY OF MINERALS

Three credits (three hours per week)

Open to juniors and seniors.

A study of crystallography, embracing projection and the geometric relations of crystal planes. The identification of minerals from crystal measurement and mathematical calculation. Crystal nomenclature.

MR. GROUT
First semester

6. PHYSIO-CHEMICAL METHODS WITH THEIR APPLICATIONS

Three credits (three hours per week)

Open to seniors.

The method of micro-chemical analysis described and demonstrated: the leading elements found in minerals are determined through the aid of crystalline precipitates of known compounds. Special attention is given to the study and determination of the rock-making minerals.

Second semester

7. AN OUTLINE OF MINERALOGY

Two credits (one hour per week)

Open to juniors and seniors.

A study of methods of identification of minerals, with their applications. Conferences, reading, and demonstrations.

MR. GROUT
Both semesters

FOR GRADUATES

8. ORIGINAL PROBLEMS IN MORPHOLOGICAL AND PHYSICAL MINERALOGY

PROFESSOR HALL AND MR. GROUT

Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

Investigations in mathematical crystallography and its application to crystal development and structure. Further applications than are made in course 4 of the optical characters of minerals in identification of mineral species.

9. SPECIAL INVESTIGATIONS IN CHEMICAL AND PHYSICAL MINERALOGY

MR. GROUT

Open to graduate students; other arrangements may be ascertained upon application to the department.

Special attention is here given to tenacity and electrical properties and their relation to crystal form, cleavage and fracture. Dimorphous compounds are investigated and the conditions governing their formation studied. The physical properties of artificial mineral compounds are compared with those of natural minerals.

10. MINERAL OCCURRENCES AND ASSOCIATION PROFESSOR HALL AND MR. GROUT

Both semesters

Open to graduate students; other arrangements may be ascertained upon application to the department.

A discussion of genetic relationships. Field work in connection with the different phases of the particular problem in hand.

The equipment of the department of geology and mineralogy is sufficient for many lines of graduate work. The department has collected from many localities, both within and without the state, and the Geological Survey made extensive collections during the years of its active field work. The material thus gathered, the published literature on the state and the field within easy access from the University afford suggestions of unsolved problems in a number of different geological lines.

PATHOLOGY AND BACTERIOLOGY

The present courses in general pathology and bacteriology for medical and engineering students are offered as minors for Ph. D. and as majors for the master's degree.

A major for the Ph. D. shall consist of research in pathology for medical or experimental medicine, prerequisite to which certain of the regular courses offered in this department must be satisfactorily completed.

Before entrance into any course offered in this department, a working knowledge of certain groups of subjects such as histology and embryology, animal biology, anatomy, physiology, botany, chemistry, physics, etc., must be had.

1. GENERAL BACTERIOLOGY PROFESSOR WESBROOK, ASSISTANT PROFESSOR HILL AND DR. PRATT

Lectures and demonstrations. The general scope of bacteriology, the history of its development and the biological and chemical problems involved in the life history of bacteria will be dealt with. The classification of the various bacterial forms, the methods of isolation and culture and the composition and manufacture of culture media will be studied until a thorough knowledge of technique is acquired. General and special study of the various antiseptics, disinfectants and bactericidal substances and conditions will be undertaken.

Laboratory work, involving the making of their own culture media by the students, the study of bacteria in cultures and under the microscope, technique of staining and other methods, including observations of chemical and biological peculiarities, will be thoroughly carried out. Testing of various germicides—chemical and physical—and the use of bacteriological methods in the examination of drinking water will form an important part of the work. Bacterial activities concerned in sewage purification, etc., will receive attention. Twenty hours per week during the last eight weeks of the second semester, second year.

2. GENERAL PATHOLOGY PROFESSOR WESBROOK, DR. MULLIN AND DR. ROBERTS

Twenty hours per week during the last eight weeks of the second semester, second year.

Lectures, demonstrations and laboratory work on the general processes involved in disease to include the study of inflammation, the degenerations and tumors.

PHARMACY

THE GRADUATE COURSE IN THE COLLEGE OF PHARMACY

In addition to its regular undergraduate course this college offers two graduate courses, the first continuing through one college year and leading to the degree of "master of pharmacy," and the second continuing through an additional year or longer, and leading to the degree of "doctor of pharmacy." The first graduate course, the one leading to the master's degree, is now in operation. It is intended that the curriculum shall include higher pharmaceutical chemistry, pharmaceutical assaying, higher organic chemistry, proximate and ultimate analysis, chemistry of food, spectroscopic work, therapeutics, and bacteriology, and a thesis of at least 3,000 words, embodying the results of original work, but this curriculum may be changed by the faculty if occasion or experience require.

The requirements for admission are a diploma from a Minnesota high school of the first grade, or an equivalent; a diploma from a college of pharmacy whose curriculum, extent and kind of work and length of undergraduate course are equal to those of the undergraduate work of this college; an acquaintance with either German or French sufficient to enable the student to read and understand the scientific literature of those languages, and a certificate of registration as pharmacist from any state board of pharmacy. The fees for this course will be seventy-five dollars, and, upon graduation, an additional fee of ten dollars for diploma. The rules relating to damage, waste and breakage in laboratories are the same as those applying to the undergraduate course.

The course leading to the doctor's degree will begin as soon as there are sufficient applicants.

PHILOSOPHY AND PSYCHOLOGY

FOR UNDERGRADUATES AND GRADUATES

3. **EDUCATIONAL PSYCHOLOGY** ASSISTANT PROFESSOR MINER AND MR. HAYNES
Three credits (three hours per week) Second semester

Open to those who have completed course 1.

The study of mental developments in its relation to heredity and training. Lectures and student reports on the facts and theories of childhood and adolescence with special reference to their bearing on education.

5. **EXPERIMENTAL PSYCHOLOGY: HIGHER MENTAL PROCESSES** ASSISTANT PROFESSOR MINER
Three credits (three hours per week) Second semester

Open to juniors and seniors who have completed courses 1 and 4.

A continuation of course 4 with experiments on affection, memory, attention, and such other processes as can be studied by laboratory methods. The quantitative phase of experimental psychology is taken up for special discussion.

6. **OUTLINE OF EXPERIMENTAL PSYCHOLOGY** ASSISTANT PROFESSOR MINER
Three credits (three hours per week) Second semester
Open to juniors and seniors who have completed course 1; not given in 1908-9.

A study of the methods and accredited results of experimental investigation in psychology. Class-room demonstrations, lectures, and discussion.

7. **PSYCHOLOGICAL INTERPRETATION** ASSISTANT PROFESSOR MINER
Three credits (three hours per week) First semester

Open to juniors and seniors who have completed course 1.

Unusual and pathological mental states are studied for the light they throw upon normal mental life. The student is given drill in the detecting of mental defects and in the psychological explanation of characters in history and literature. The subconscious, dreams, suggestibility, telepathy, nervous disorders, insanity, secondary personalities, and the crowd are among the topics treated.

8. **PSYCHOLOGICAL PRINCIPLES** ASSISTANT PROFESSOR SWENSON
Three credits (three hours per week) Second semester

Open to juniors and seniors who have completed courses 1 and 2.

An advanced course treating in detail some of the more important theoretical problems connected with psychology. The discussions will center about the methods and aim of the science, its fundamental principles, and its relations to other sciences, regard being had to the general outlines of historical development in these respects.

9. **ANCIENT AND MEDIAEVAL PHILOSOPHY** PROFESSOR WILDE
Three credits (three hours per week) First semester
Open to juniors and seniors who have completed course 1 or course 2.

This and the following course are designed to give such an outline of the history of thought as is desirable in a general education. Emphasis is placed upon the human significance of philosophy rather than upon its purely technical aspect. In this first semester the main work will be upon the philosophies of Plato and Aristotle, but the later development will be traced as far as the Renaissance.

10. **MODERN PHILOSOPHY** PROFESSOR WILDE
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 1 or course 2.

Lectures on the representative systems of modern philosophy from the Renaissance to our own day, the purpose of the course being to prepare the student to understand the philosophical tendencies of the present. The work will include a study of Bacon, Descartes, Spinoza, Leibnitz, Locke, Berkeley, Hume, Kant, Mill, Schopenhauer.

11. **PRINCIPLES OF ETHICS** PROFESSOR WILDE
 Three credits (three hours per week) First semester
 Open to juniors and seniors who have completed course 1 or course 2.

An introductory course, comprising a study of the distinction between moral and non-moral phenomena, an analysis of voluntary conduct, and a discussion of the nature of conscience, the meaning of right and wrong, the purpose of life, human responsibility, and the authority of moral law.

12. **PHILOSOPHY OF RELIGION** PROFESSOR WILDE
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 1 or course 2.

A study of the religious consciousness, its origin, development and significance; an analysis of the conception of God and a discussion of the place and function of religion in modern life.

ADVANCED INTENSIVE COURSES

13. **LOGIC OF SCIENCE** ASSISTANT PROFESSOR SWENSON
 Three credits (three hours per week) Second semester
 Open to juniors and seniors who have completed course 2.

This course serves as an introduction to philosophy through the medium of the special sciences, its aim being to suggest a system of the sciences through a discussion of the nature and relations of their fundamental principles.

FOR GRADUATES

Courses from the following list will be offered to graduates each year as determined by the needs and qualifications of the students presenting themselves. It is desirable that students consult with the department as early in the session as possible in order that the course and hours may be arranged to suit the greatest number.

14. **PSYCHOLOGICAL PROBLEMS** ASSISTANT PROFESSOR MINER
Both semesters
 Open to seniors and graduate students who have completed courses 1, 4, and 5; other arrangements may be ascertained upon application to the department.
 Original work on special topics.

15. **RESEARCH IN PSYCHOLOGY** ASSISTANT PROFESSOR MINER
 Six credits (three hours per week) Both semesters
 Open to graduate students who have completed course 14; both semesters must be taken before credit is given for the first semester.

Minor or major research in experimental, educational, analytic, genetic, or comparative psychology.

16. **THE PHILOSOPHY OF DESCARTES, SPINOZA, AND LEIBNITZ** ASSISTANT PROFESSOR SWENSON
 Six credits (three hours per week) Both semesters
 Open to seniors and graduates who have completed courses 1, 2, 9, and 10; both semesters must be completed before credit is given for the first semester.

A study of the pre-critical period of modern philosophy. The work will center in the discussion of the *Ethics* of Spinoza and *Monadology* of Leibnitz.

17. **THE PHILOSOPHY OF KANT** ASSISTANT PROFESSOR SWENSON
 Six credits (three hours per week) Both semesters
 Open to seniors and graduate students who have completed
 courses 1, 2, 9, and 10; both semesters must be completed
 before credit is given for the first semester.
 A critical reading of the three Critiques; the relation of Kant to the
 development of modern philosophy.
18. **THE PHILOSOPHY OF HUME** ASSISTANT PROFESSOR SWENSON
 Six credits (three hours per week) Both semesters
 Open to seniors and graduates who have completed courses 1,
 2, 9, and 10; both semesters must be completed before credit
 is given for the first semester.
 A critical reading of Hume's philosophical works; the position of Hume
 in the development of English philosophy.
19. **THE PHILOSOPHY OF HERBERT SPENCER** ASSISTANT PROFESSOR SWENSON
 Three credits (three hours per week) Second semester
 Open to seniors and graduate students who have completed
 courses 1 and 2.
 A critical reading of the *First Principles* with references to other im-
 portant features of the *Synthetic Philosophy* and to the philosophical charac-
 ter of the modern scientific movement. The course is intensive, the aim
 being to develop the power of philosophical criticism in regard to such
 questions as the logical foundations of the theory of evolution, the relations
 of science and religion, and the place of the scientific interest among the
 other interests of life.
20. **METAPHYSICS** ASSISTANT PROFESSOR SWENSON
 Six credits (three hours per week) Both semesters
 Open to seniors and graduate students who have completed course
 9 and course 10 or 11; both semesters must be completed
 before credit is given for the first semester.
 A critical and constructive discussion of theories of knowledge and
 reality.
21. **SYSTEMATIC ETHICS** PROFESSOR WILDE
 Six credits (three hours per week) Both semesters
 Open to seniors and graduate students who have completed
 courses 9, 10, and 11; both semesters must be completed before
 credit is given for the first semester.
 A detailed study of the principles of conduct and the basis of moral
 obligation.
22. **HISTORY OF ETHICS** PROFESSOR WILDE
 Six credits (three hours per week) Both semesters
 Open to seniors and graduate students who have completed
 courses 9, 10, and 11; both semesters must be completed before
 credit is given for the first semester.
 A critical study of the development of Greek, English, and German ethical
 thought. Chief attention will be paid to the work of Plato and Aristotle in
 ancient times, and to the relation between utilitarianism and idealism in
 modern philosophy.
23. **GERMAN IDEALISM** PROFESSOR WILDE
 Six credits (three hours per week) Both semesters
 Open to graduate students who have completed courses 9, 10,
 and 17; both semesters must be completed before credit is
 given for the first semester; a knowledge of German is
 required.
 A study of the development of German philosophy after Kant, especially
 as found in the writings of Fichte and Hegel.

PHYSICS

FOR UNDERGRADUATES AND GRADUATES

5. **ADVANCED GENERAL PHYSICS** PROFESSOR JONES, ASSISTANT
 PROFESSORS ANTHONY ZELENY AND ERIKSON
 Six credits (seven hours per week) First semester
 Open to sophomores, juniors, and seniors, who have completed
 mathematics 4, (trigonometry); the laboratory fee is three

dollars; adapted to those students who expect to specialize in physics, to teach the science, or to enter upon a technical course.

Mechanics of solids and fluids, the properties of matter, heat, and sound. This course is intended to give a thorough training in general physics and includes the solution of numerous problems. There will be two lectures, three recitations, and one laboratory (double) period each week.

6. ADVANCED GENERAL PHYSICS

PROFESSOR JONES, ASSISTANT

PROFESSORS ANTHONY ZELENY AND ERIKSON

Six credits (seven hours per week)

Second semester

Open to sophomores, juniors, and seniors, who have completed course 5; the laboratory fee is three dollars; intended for those students who wish to specialize in the science, to teach the subject, or to enter upon a technical course.

Light, electricity and magnetism. This course completes the work in general physics. There will be two experimental lectures, three recitations, and one (double) laboratory period each week.

7. ELECTRICAL MEASUREMENTS

ASSISTANT PROFESSOR ANTHONY ZELENY

Three credits (five hours per week)

First semester

Open to juniors and seniors who have completed courses 5 and 6; the laboratory fee is five dollars.

The course aims to give a thorough practical knowledge of electrical instruments and the fundamental electrical measurements. The system of electrical units is developed theoretically and experimentally. There will be two (double) laboratory periods each week, the class being divided into sections for that purpose.

8. PHYSICAL MANIPULATION AND LABORATORY TECHNIQUE

PROFESSOR JOHN ZELENY

Three credits (six hours per week)

Second semester

Open to juniors and seniors who have completed courses 5 and 6; the laboratory fee is three dollars; especially valuable to those who intend to teach the science or to specialize in it.

The object of this course is to give the student a knowledge of the essential physical manipulations (such as the cleaning and distilling of mercury, soldering, glass blowing, glass cutting, glass grinding, making of quartz fibers, etc), and to acquaint him with the use of some instruments of precision (such as the cathetometer, the dividing engine, the balance, mercury air pumps and gauges, etc.)

9. DYNAMICS

PROFESSOR JONES

Three credits (three hours per week)

First semester

Open to juniors and seniors who have completed courses 5 and 6, and mathematics 6 and 7 (calculus).

A discussion of some problems in dynamics which are important in the study of advanced physics.

10. ADVANCED PHYSICAL MEASUREMENTS

PROFESSOR JOHN ZELENY

Three credits (six hours per week)

First semester

Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is three dollars.

The course consists of individual work in the laboratory on topics specially chosen to serve best the needs and capacity of each student. The course is intended to introduce the student to some of the more intricate physical measurements and to teach him self-reliance.

11. ADVANCED PHYSICAL MEASUREMENTS

PROFESSOR JOHN ZELENY

Six credits (twelve hours per week)

First semester

Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is five dollars.

The same as course 10 except that twice as much time is devoted to the subject.

13. ELECTRICAL MEASUREMENTS OF PRECISION

ASSISTANT PROFESSOR

ANTHONY ZELENY

Three credits (six hours per week)

Second semester

Open to seniors who have completed course 7; the laboratory fee is three dollars; intended for electrical engineering and scientific students who desire to specialize in electrical work of the highest precision.

The course is chiefly experimental and includes the following: making of standard cells; calibration of Wheatstone box bridge; adjustment of resistances, ammeters, and voltmeters; use of the potentiometer in measurements of highest precision; experimental problems involving capacity, inductance, and magnetic flux; measurement of temperatures by electrical methods.

FOR GRADUATES

12. **THE THEORY OF LIGHT** PROFESSOR JONES
 Three credits (three hours per week) Second semester
 Open to graduate students who have completed courses 5 and 6, and mathematics 6 and 7 (calculus).
 A study of the important optical phenomena. Preston's *Theory of Light* is used as a text.
14. **RADIO-ACTIVITY** MR. KOVARIK
 Six credits (three hours per week) Both semesters
 Open to graduate students who have completed courses 5 and 6.
 The course consists entirely of lectures, experimental and descriptive. The various theories and the methods of investigation are fully considered.
15. **ADVANCED PHYSICAL MEASUREMENTS** PROFESSOR JOHN ZELENY
 Three credits (six hours per week) Second semester
 Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is three dollars.
 The course is the experimental study of some physical phenomena, the nature or laws of which are not yet understood.
16. **ADVANCED PHYSICAL MEASUREMENTS** PROFESSOR JOHN ZELENY
 Six credits (twelve hours per week) Second semester
 Open to seniors and graduate students who have completed courses 5 and 6; the laboratory fee is five dollars.
 The same as course 5, except that twice as much time is devoted to the subject.
17. **THE KINETIC THEORY OF GASES** ASSISTANT PROFESSOR ERIKSON
 Three credits (three hours per week) Second semester
 Open to graduate students who have completed courses 5 and 6, and mathematics 6 and 7 (calculus).
 This course is a study of Meyer's *Kinetic Theory of Gases*.
18. **DISCHARGE OF ELECTRICITY THROUGH GASES** PROFESSOR JOHN ZELENY
 Three credits (three hours per week) First semester
 Open to graduate students who have completed courses 5 and 6, and mathematics 6 and 7 (calculus).
 The course consists of lectures, with experimental illustrations, on the conduction of electricity through gases. A study is made of the conductivity imparted to gases by the action of X-rays, ultra-violet light, radioactive substances, and glowing metals; of the discharge of electricity from points and in vacuum tubes; and of the spark and arc discharges. The methods of measuring the velocity of the ions and the charges carried by them are studied in detail.
19. **THE MATHEMATICAL THEORY OF ELECTRICITY AND MAGNETISM** PROFESSOR JOHN ZELENY
 Three credits (three hours per week) Second semester
 Open to graduate students who have completed courses 5 and 6, and mathematics 6 and 7 (calculus).
 This course consists in the study of J. J. Thomson's *Elements of the Mathematical Theory of Electricity and Magnetism*.

POLITICAL SCIENCE

FOR UNDERGRADUATES AND GRADUATES

2. **COMPARATIVE GOVERNMENT** MR. ALLIN
 Three credits (three hours per week) First semester
 Open to those who have completed course 1.
 A description and analysis of the government as the agent of the state: a comparative study of the organization and working of the governments of the great European powers of today, especially of France, Germany, Great Britain and Italy. Text, with lectures and assigned readings.

3. THE ELEMENTS OF JURISPRUDENCE

PROFESSOR SCHAPER

Three credits (three hours per week)

First semester

Open to those who have completed course 1.

A study of those human relations requiring legal regulation considered from the American point of view: the nature and source of law, status, rights and wrongs, partnership, corporations, etc. The course is intended for active citizenship and for the study of law. The student will practice looking up cases and summarizing leading principles. The course is based on a text, with lectures and assigned reading.

7. MUNICIPAL ADMINISTRATION

PROFESSOR SCHAPER

Three credits (three hours per week)

Second semester

Open to those who have completed course 1.

A comparative study in modern city charters and methods of administration, the relation of the city to the state, the delimitation of its sphere of activity, its liability for tort, and an investigation into the causes of municipal corruption and merits of proposed reforms. A text, lectures, and special topics.

8. THEORY OF THE STATE

PROFESSOR SCHAPER

Three credits (three hours per week)

Second semester

Open to those who have completed courses 1 and 2.

A study in the theory of the state, its origin, nature, purpose and justification, the elements of population and territory. Important theories, like the divine, contract, modern socialistic, individualistic, and social welfare, are considered; also the question of state interference and state management of industries. This course includes a study of classification of law, governments, and states. A text-book, with lectures and topical readings.

9. POLITICAL PARTIES

PROFESSOR SCHAPER

Two credits (two hours per week)

First semester

Open to those who have completed courses 1 and 2.

An advanced course in political parties, their origin, development, and function. Such topics as methods of making nominations, securing minority representation, the recall, the initiative and referendum are taken up. Text, lectures, and special topics.

10. DIPLOMACY

MR. ALLIN

Two credits (two hours per week)

Second semester

Open to those who have completed course 1.

The object of this course is to outline the growth of international relations, the mode of conducting foreign affairs, the relation of the treaty-making power to legislation, the duties and immunities of diplomats, the consular service, the framing, interpretation, and termination of treaties and compacts, and the character and procedure of courts of arbitration. A survey will be made of the history of American diplomacy and of contemporary international politics. Text, lectures, and supplementary reading.

12. COLONIAL ADMINISTRATION

MR. ALLIN

Three credits (three hours per week)

Second semester

Open to those who have completed courses 1 and 2.

This course embraces a discussion of the principal classes of colonies, the causes of colonization, the social, economic, and political tendencies of colonial development, imperial relations, preferential trade, and independence. A study is made of the political systems of modern colonial governments, of the organization and administration of the Spanish, English, French, Dutch, German, and American colonies. Lectures, assigned reading, and special topics.

13. TEACHER'S COURSE IN GOVERNMENT

One credit (one hour per week)

Second semester

Open to students of suitable preparation who intend to teach

American government in the secondary schools.

Lectures and the examination of text-books, maps, and other materials useful to teachers.

15. STATE AND LOCAL ADMINISTRATION

PROFESSOR SCHAPER

Two credits (two hours per week)

Second semester

Open to those who have completed course 1.

A special course in the problems of our state and local governments: a comparative study of new experiments in legislation and administration, the workings of our courts, the jury system, and the new state police. Lectures, cases, and special topics.

FOR GRADUATES

4. **AMERICAN CONSTITUTIONAL LAW** PROFESSOR SCHAPER
 Four credits (two hours per week) Both semesters
 Open to those who have completed courses 1, 2, and 8; both semesters must be completed before credit is given for the first semester; given in alternate years; not offered in 1908-9.
 This is an advanced course in the study of the principles of our constitutional law based on important Supreme Court decisions and standard works.
5. **INTERNATIONAL LAW** MR. ALLIN
 Six credits (three hours per week) Both semesters
 Open to those who have completed courses 1 and 2.
 This course treats of the nature, sources, and sanction of international law; of the general principles as developed by positive agreement, common usage, and judicial decisions, in particular of the status of nations, the rules of peace, neutrality, and war, and the arbitration movement. Text, lectures, and supplementary reading.
11. **SEMINAR IN POLITICAL SCIENCE** PROFESSOR SCHAPER AND MR. ALLIN
 Six credits (three hours per week) Both semesters
 Open to graduate students and seniors of suitable preparation.
 A seminar for research in the field of political science. A feature of the seminar is the discussion of current problems in politics and administration.
14. **ADMINISTRATIVE LAW** PROFESSOR SCHAPER
 Two credits (two hours per week) Second semester
 Open to those who have completed courses 1, 2, and 8, and to graduates.
 A course dealing with administration as a science, its origin and development, the law of officers under the national government, the merit system, and the growth of special administrative tribunals. Text, lectures, and cases.

SCANDINAVIAN

FOR UNDERGRADUATES AND GRADUATES

5. **OLD NORSE (Icelandic)** PROFESSOR BOTHNE
 Four credits (two hours per week) Both semesters
 Open to those who have completed courses 1 and 2, or 3 and 4, and to other qualified students with the approval of the department.
 Grammar and reading. *Gunnlaugs Saga Ormstungu*.
6. **MODERN NORWEGIAN LITERATURE** PROFESSOR BOTHNE
 Six credits (three hours per week) Both semesters
 Open to those who have completed courses 1 and 2; both semesters must be completed before credit is given for the first semester.
 History of Norwegian literature from 1814 to the present day. Special attention paid to Björnson and Ibsen.
7. **SWEDISH LITERATURE** PROFESSOR STOMBERG
 Six credits (three hours per week) Both semesters
 Open to qualified students upon the approval of the department; both semesters must be completed before credit is given for the first semester.
 History of the literature and study of modern authors, including Selma Lagerlöf, Geijerstam, Strindberg.
8. **IBSEN** PROFESSOR BOTHNE
 Two credits (two hours per week) First semester
 Open to qualified students upon the approval of the department.
 Lectures and readings.
9. **HISTORY OF NORTHERN EUROPE** PROFESSOR STOMBERG
 Six credits (three hours per week) Both semesters
 Open to juniors and seniors; no knowledge of the Scandinavian languages is required.
 The course includes the history of the Scandinavian countries from the earliest period to recent times.

FOR GRADUATES

12. MODERN SWEDISH LANGUAGE AND LITERATURE

13. HISTORY OF THE SCANDINAVIAN LANGUAGES

For courses in Scandinavian philology, see the statement of the department of comparative philology.

SEMITIC LANGUAGES

FOR UNDERGRADUATES AND GRADUATES

1. ELEMENTARY HEBREW

ASSISTANT PROFESSOR DEINARD

Six credits (three hours per week)

Both semesters

Open to sophomores, juniors, and seniors; both semesters must be completed before credit is given for the first semester.

First semester, Harper's *Elements of Hebrew* and reading of easy prose passages from the Old Testament; second semester, critical reading of some book of the Old Testament and a review of Hebrew grammar.

2. ELEMENTARY ARABIC

ASSISTANT PROFESSOR DEINARD

Six credits (three hours per week)

Both semesters

Open to those who have completed course 1; both semesters must be completed before credit is given for the first semester.

First semester, Socin's *Arabic Grammar* and the reading of the prose sections contained in it; second semester, selected suras from the Koran and a review of Arabic grammar.

3. ELEMENTARY ARAMAIC OR SYRIAC

ASSISTANT PROFESSOR DEINARD

Three credits (three hours per week)

Second semester

Open to those who have completed course 1.

The course is based upon Strach's *Grammatik des Biblischen Aramaisch* or Brockelman's *Syrische Grammatik*.

4. HISTORY OF THE HEBREWS TO THE CLOSE OF THE PERSIAN PERIOD

ASSISTANT PROFESSOR DEINARD

Six credits (three hours per week)

Both semesters

Open to sophomores, juniors, and seniors; no knowledge of any Semitic language is required.

A survey of the political, social, and religious life of the Hebrews. The English Bible will be used as a text-book, a careful study of the Palestinian, Egyptian, and Assyro-Babylonian inscriptions will be made, and the works of some modern writers on Hebrew history will be consulted.

FOR GRADUATES

1. CRITICAL STUDY OF ONE OF THE FOLLOWING OLD TESTAMENT BOOKS

ASSISTANT PROFESSOR DEINARD

Isaiah, The Minor Prophets, The Psalms, or Job.

2. EARLY ARABIC POETRY

ASSISTANT PROFESSOR DEINARD

And the relation of the Arabic, grammatically considered, to the Hebrew.

3. READING OF THE ARAMAIC PORTIONS OF THE OLD TESTAMENT

ASSISTANT PROFESSOR DEINARD

And a review of Aramaic grammar.

4. HISTORY, PROPHECY AND THE MONUMENTS

ASSISTANT PROFESSOR DEINARD

Studies in the early history of the Semites.

SOCIOLOGY

FOR UNDERGRADUATES AND GRADUATES

5. SOCIAL GROUPS

PROFESSOR SMITH

Three credits (three hours per week)

First semester

Open to those who have completed course 1.

An examination of the clan and the village in primitive life, a study of demography to discover the effect of environment upon social organization, and a comparison with the nature of and reasons for the modern city.

6. THE STUDY OF INSTITUTIONS**PROFESSOR SMITH**
First semester

Three credits (three hours per week)

Open to those who have completed course 1.

The genesis of custom and the beginnings of law with the geographical and race influence in the growth of states will be studied as well as the various forms of the family and their relation to forms of civilization.

7. ANTHROPOLOGY**PROFESSOR JENKS**
First semester

Three credits (three hours per week)

Open to juniors and seniors.

This is an elementary course studying the essential characteristics of mankind and the general features of the several races of men. It also investigates the origin and development of the series of activities and various institutions which have had their beginnings in primitive society. Text books, lectures, assigned readings, and thesis.

8. ETHNOLOGY**PROFESSOR JENKS**
Second semester

Three credits (three hours per week)

Open to juniors and seniors who have completed course 1, 2, or 7, and to graduate students.

This is a study of the different races of men in America, Europe, Asia, Africa, and Oceania; the various historical classifications of men into races are presented; the causes of the origin and distribution of the several races and subraces are sought, and from historical perspective and present indications an attempt is made to judge of the future development of races; ethnological problems are also presented. Text-books, lectures, assigned readings, and thesis.

9. THE PHILIPPINE PEOPLE**PROFESSOR JENKS**
Second semester

Three credits (three hours per week)

Open to juniors, seniors, and graduate students.

This course presents the geography, natural resources, and ethnology of the Philippine Islands. A careful comparative study of the four large ethnic and culture groups of people is made; tropical influences are noted; the present policy of the Insular Civil Government is outlined, so far as it tends to modify the natural characteristics and modern culture of the inhabitants, and to affect American home interests in the orient. This course aims to present a practical model for the investigator of human culture, and to introduce students to oriental race problems; it will also better fit students for government business or missionary service in the orient. Lectures, illustrated lectures, assigned readings, and thesis.

10. PHYSICAL ANTHROPOLOGY**PROFESSOR JENKS**
Second semester

Three credits (three hours per week)

Open to juniors and seniors who have completed course 7 or 8, and to graduate students.

This course studies the physical variations in the human body. It pays special attention to those variations which distinguish one race or group of men from another; and it seeks the cause and significance of such variations. It also attempts to trace the physical evolution of the human body and to forecast its future, studying both its development and decline. Six lectures on the development and anatomy of the human brain are given by Dr. Charles A. Erdmann of the medical faculty. This course is of prime importance to advanced students preparing for the medical course. Lectures, laboratory work, assigned readings, and thesis.

11. THE AMERICAN NEGRO RACE**PROFESSOR JENKS**
Second semester

Three credits (three hours per week)

Open to juniors, seniors, and graduate students; not given in 1908-9.

This course begins with a study of the negro's African tribal kinsmen and traces the rise and development of the American negro race from the birth of American slavery. The present characteristics, traits, and conditions of the negro are especially considered. The developing tendencies of the negro are studied for the purpose of considering the probable future of the American negro race. Lectures, assigned readings, and thesis.

12. THE AMERICAN PEOPLE**PROFESSOR JENKS**
First semester

Three credits (three hours per week)

Open to juniors, seniors, and graduate students.

This course presents the distribution in the United States of the different peoples of the world found here. It seeks the natural genius of the peculiar home development of these peoples, and notes the modifications of this development in America, thus portraying the ethnic contribution of each to

American civilization. It aims to discover the dominant physical, mental, and moral characteristics of each people, and attempts to determine the relative ethnic and culture importance of each to the nation.

13. **BIBLICAL SOCIOLOGY** PROFESSOR SMITH
Three credits (three hours per week) First semester
Open to juniors, seniors, and graduate students.

Lectures, and the Old Testament as a text book.

14. **MODERN SOCIAL INSTITUTIONS** ASSISTANT PROFESSOR REEP
Three credits (three hours per week) First semester
Open to those who have completed course 7.

The fundamental social institution, the family, will be studied, as also the development of modern industrial, political, educational, and ecclesiastical institutions in their relation to human progress.

STRUCTURAL ENGINEERING

FOR UNDERGRADUATES AND GRADUATES

14. **STRUCTURAL DESIGN** PROFESSOR CONSTANT, MR. KESNER
Five credits (ten hours per week) First semester
Post senior. Open to students who have completed courses 12 and 13.

Theory and design of steel structure, including mill buildings, railway and highway bridges, standpipes and towers and other problems of structural interest. Lectures, problems and design. Merriman and Jacoby's Roofs and Bridges, Part III, Standard Specifications.

15. **STRUCTURAL DESIGN** PROFESSOR CONSTANT, MR. KESNER
Five credits (ten hours per week) Second semester
Post senior, continuation of course 14, C. E.

With special reference to the design of a steel railway bridge and the theory and design of steel arch bridges. Lectures, problems and designs. Merriman and Jacoby's Roofs and Bridges, Part IV.

17. **MASONRY CONSTRUCTION** PROFESSOR CONSTANT
Four credits First semester
Post senior, preparation required course 12, C. E.

Foundations, design and use of cribs, cofferdams and pneumatic caissons, pressure of earth, design of retaining walls, piers, abutments, dams and chimneys. Properties of stones, bricks, cement and concrete. Recitations and lectures, three hours per week; drawing room work, four hours per week. Fowler's Deep Foundations; Taylor and Thompson's Concrete and Reinforced Concrete; Howe's Retaining Walls for Earth, and current periodical engineering literature.

18. **REINFORCED CONCRETE** PROFESSOR CONSTANT
Three credits, (six hours per week) Second semester
Post senior. Preparation course 17, C. E., optional.

Theory and design of reinforced concrete beams, slabs and columns, application of reinforced concrete to buildings, dams, retaining walls and arches. Lectures, problems and design. Turneaure and Maurer's Principles of Reinforced Concrete.

FOR GRADUATES

16. **SWING BRIDGES** PROFESSOR CONSTANT
Four credits, (eight hours per week) Second semester
Post senior, C. E. course.

Theory and design of swing and bascule bridges, with special attention to the design of the operating machinery. Moving structures. Lectures, problems and design. Merriman and Jacoby's Roofs and Bridges, Part IV. Reference works on machine design. Students intending to take this course are advised to elect machine design, 13 M. E., first semester, senior year.

19. **HIGHER STRUCTURES** PROFESSOR CONSTANT
Theory and design of cantilever, suspension and arch bridges. Analysis of indeterminate structures and complex portal bracing. General theory of flexure and application to special problems.



DEGREES GRANTED IN 1907



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Degrees Granted in 1907

Total, 507.

THE COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

FOR THE DEGREE OF BACHELOR OF ARTS—194.

Ella M. Anderson, Hibbing,
Inez A. Applebee, Anoka.
Florence Fay Atwater, Minneapolis.
Donald Campbell Babcock,
Grand Forks, N. D.
Lora D. Bacon, Minneapolis.
Walter Lucius Badger, Minneapolis.
Edith Margaret Barrett, Stillwater.
Clara Hughes Bearnse, Minneapolis.
Edla Gustavia Berger, St. Paul.
Blanche Leonora Bicknell,
Minneapolis..
Nathan Bishop Blackburn,
Minneapolis.
Carl Wm. Blegen, Minneapolis.
Margaret Sidle Bliss, Minneapolis.
Edna Beatrice Bowler, Minneapolis.
Ethel Seraphia Brooberg, Minneapolis.
Pearl M. Brooks, Minneapolis.
Montreville J. Brown, Minneapolis.
Essie May Burgan, Minneapolis.
Beulah Isabel Burton, Minneapolis.
Anna Butler, Minneapolis.
Marietta Butler, Minneapolis.
Frederic David Calhoun, Minneapolis.
Alma Beatrice Campbell, Minneapolis.
Anna Jean Campbell, Hopkins.
Carl G. Campbell, Burkeville, Va.
Ezra Eugene Chadwick, Minneapolis.
Frances De Larsh Chamberlain,
Minneapolis.
Emily K. Chapman, Sioux Falls, S. D.
Frances Mildred Clark, Minneapolis.
Wall G. Coapman, Columbus, Wis.
Edna Gertrude Cockburn, Minneapolis.
Pansy B. Cogrove, Minneapolis.
Florence Cooper, Minneapolis.
Mary Elizabeth Copley, St. Paul.
Ella G. Cox, Cloquet.
Earl H. Cressy, Minneapolis.
Rose A. Crosman, Minneapolis.
Agnes Ray Crounse, Minneapolis.
Anna C. Dorothy Dahl, Minneapolis.
Effie Harriet Dahlberg, Minneapolis.
Izella Mabel Dart, Litchfield.
Raymond H. Dart, Litchfield.
Katharine Lee DeVeau, Minneapolis.
Richard Herbert Dewart, Portland,
Oregon.
Grace Dickinson, Buffalo.

Althea Diether, St. Paul.
Katharine Donovan, Clontarf.
Mary Irene Dunn, St. Cloud.
Ralph Emerson Dyar, Winona.
Dana Magoon Easton, Warren.
Michael Higgins Ebert, Glencoe.
George Rupert Eichholzer,
Owatonna.
Elven Tinus Ellefson, Dawson.
Culver Ellison, Minneapolis.
Edna Elmer, Minneapolis.
Mary Celestine Enright, St. Paul.
Gertrude Sophia Evans, Miles City,
Mont.
Elizabeth Pillsbury Fairfield,
Minneapolis.
Mary Harriet Ferraby, Willmar.
Bernice Vivian Frey, Minneapolis.
Lucius Arnold Frye, St. Paul.
Helen Tolman Gallup, St. Cloud.
Mildred Belle Gaus, Minneapolis.
Gertrude Lucile Gee, Monticello.
Mabel Hastings Gibbs, Waterville.
Mary Fidele Gleason, Minneapolis.
Arnold Gloor, Minneapolis.
Edna Hall Gould, Minneapolis.
Mary Gould, Winona.
Grace Elberta Green, Minneapolis.
Richard Leslie Griggs, Virginia.
C. Clarice Grindeland, Warren.
Florence Catherine Guthrie,
Blooming Prairie.
Mildreth Janet Haggard, Minneapolis.
Orrin Ives Hall, Zumbrota.
Lola Hammond, Minneapolis.
Mabel J. Hansen, Alden.
Howard Hurlbut Hare, Minneapolis.
Constance Margaret Hartgering,
Rapid City, S. D.
Irma Hathorn, Minneapolis.
Corinne Heffner, Minneapolis.
Gussie Beatrice Heffron, Bemidji.
Mary Clymo Helson, St. Paul.
Frances Hicks, St. Paul.
Marie Alice Higbee, Minneapolis.
Adele Lucile Higgins, Minneapolis.
Fannie Higgins, Minneapolis.
Helen Hill, St. Cloud.
Ruth Harriet Hill, Minneapolis.
Clara Elizabeth Hille, Fergus Falls.

Edith May Phelps, Minneapolis.
Clara P. Pitts, Alton, Ia.
Edward John Pohlmann, Minneapolis.
Mary Naomi Powers, Granite Falls.
Sara Morrow Preston, Minneapolis.
Harry C. Quackenbush, West Concord.
Claude David Randall, St. Paul.
Elizabeth Rich, Minneapolis.
Alvin J. M. Robertson, Sleepy Eye.
Ethel Rockwood, Minneapolis.
Clara Elizabeth Ross, New Ulm.
Arthur Gale Rossman, St. Paul.
Margaretta E. Roth, Robbinsdale.
Anna Cecillia Ryan, St. Paul.
Margaret Anne Ryan, Duluth.
Rasmus S. Saby, Radcliffe, Ia.
Eureka A. Sahlhom, Worthington.
Charlotte Sanborn, Minneapolis.
Rose Marie Schaller, Hastings.
Lillian Christine Schmitt, Mankato.
William Arthur Schummers,
Caledonia.
Frances Eleanor Skinner, Minneapolis.
Carrie Hemming Smith, Minneapolis.
Grace I. Smith, Minneapolis.
Myrtle Irene Smith, Miles City, Mont.
Simon Solie, Delavan.
Hannah D. Sparks, Minneapolis.
Ethel B. Spooner, Minneapolis.
Frieda Louise Stamm, St. Paul.
Charlotte Isabel Stevens, Minneapolis.
Minnie Stinchfield, Rochester.
Edward Francis Swenson, Luverne.
Freda E. Swenson, St. Paul.
Sabra S. Swenson, Minneapolis.
Sweyn W. Swenson, Ellsworth, Ia.
Harriet Switzer, Minneapolis.
Mabel E. Switzer, Minneapolis.
Wilber R. Taft, Monticello.
Elnora B. Theisen, Minneapolis.
Edna Elizabeth Towler, Minneapolis.
Alma Julia Triefoff, Carver.
Florence Maud Tubbs, Minneapolis.
Marjorie E. Vance, Decorah, Ia.
Alma D. Wagen, Mankato.
Adele Florence Walker, Williston, N. D.
Jennie E. Wallace, Humboldt, Iowa.
Grace Beatrice Weitzel, Minneapolis.
Camilla A. Wennerlund, Minneapolis.
Margaret Christie West, Minneapolis.
Grant A. White, Luverne.
Jacob Wilk, Minneapolis.
Anne Elizabeth Williams, St. Paul.
Clara E. Woodward, St. Paul Park.
Mary Yager, Minneapolis.

Conrad G. Selvig, Rushford.
Charles Phillip Stanley, Waupaca, Wis.

Henry William Meyerding, St. Paul.
Ignatius J. Murphy, Lakefield.
Edward L. Paulson, Linden.
Clarence George Perry, St. Paul.
Henry Albert Schmidt, Westbrook.
Herbert Henry Thompson, St. Paul.
E. Franklin Zoerb, Minneapolis.

FOR MASTER OF ARTS—20.

Levi Harrison Beeler, Stillwater.

B. A. '06, Macalester.

Major, Education; Minors, History, Political Economy.

Thesis: Suggestions for the Elementary Course of Study.

Thomas P. Beyer, St. Paul.

B. S. '03, Wesleyan University.

Major, Shakspeare; Minors, Tennyson, Beowulf.

Thesis: An Inference as to the Personality of Shakspeare, drawn from his Works.

Theodore A. Buenger, St. Paul.

B. A. '06, Minnesota.

Major, Latin; Minors, Greek, Botany.

Thesis: Cicero's *Pro Caelio*.

Frederick William Gates, Minneapolis.

Ph. B. '99, Wisconsin.

Major, Mathematics; Minors, Mathematics, Astronomy.

Thesis: Abridged Notation.

Harriet Jane Hutchinson, Minneapolis.

B. A. '03, Minnesota.

Major, History; Minors, English, Education.

Thesis: The Monroe Doctrine and its Application to the Venezuela-Guiana Boundary Dispute.

Charles Eugene Johnson, Minneapolis.

B. A. '06, Minnesota.

Major, Embryology; Minors, Entomology, Botany.

Thesis: The Thymus Gland and its Development in the Pied-billed Grebe.

Edward Carl Johnson, Minneapolis.

B. A. '06, Minnesota.

Major, Botany; Minors, Entomology, German.

Thesis: The Wintering Over of Various Cereal and Grass Rusts.

Ida Amanda Johnson, Rochester.

B. A. '06, Minnesota.

Major, History; Minors, Economics, German.

Thesis: The True Magna Carta Concept.

Alois F. Kovarik, Minneapolis.

B. A. '04, Minnesota.

Major, Radioactivity; Minors, Heat, Mechanics.

Thesis: Radioactive Emanations.

Linda H. Maley, Minneapolis.

B. A. '01, Minnesota.

Major, English; Minors, Rhetoric, Italian.

Thesis: The Technique of the Modern Drama.

Frederick C. Miller, St. Paul.

B. A. '03, Minnesota.

Major, Politics; Minors, History, Geology.

Thesis: History and Organization of the Police.

George Norton Northrop, Madison, Wis.

B. L., '01, Minnesota.

Major, English; Minors, Economics, French.

Thesis: A Study of Florio.

Louis W. Rapeer, Minneapolis.

B. S. '04, University of Chicago.

Major, Education; Minor, Sociology.

Thesis: The Problem of Grammar in the Elementary Curriculum.

Amy Irene Robbins, Robbinsdale.

B. S. '01, Minnesota.

Major, English; Minors, Archeology, Historic Design.

Thesis: The Dramaturgy of Ibsen.

William C. L. Schaefer, St. Paul.

B. A. '06, Minnesota.

Major, Education; Minors, Psychology, German.

Thesis: The Need of Men as Educators.

Homer W. Stevens, Minneapolis.

LL.M. '06, Minnesota.

Major, Politics; Minors, Economics, Law.

Thesis: Corporation Taxation in the State of Minnesota.

Alice M. Stewart, Mankato.

B. A. '06, Minnesota.

Major, Latin; Minors, German, Mathematics.

Thesis: A Comparison of Nature Treatment in the Georgics of Vergil and the *De Rerum Natura* of Lucreti.

Anna Sophia Swanson, Minneapolis.

B. L. '96, Carleton College.

Major, English; Minors, Sociology, Scandinavian.

Thesis: The Problem Drama.

Kenneth Taylor, St. Paul.

B. A. '06, Minnesota.

Major, Biology; Minors, Botany, Geology.

Thesis: The General Morphology of the Aphididae.

Roy Albion Vickery, Minneapolis.

B. A. '06, Minnesota.

Major, Entomology; Minors, Botany, Paleontology.

Thesis: A Comparative Study of the External Morphology of the Aphididae.

FOR MASTER OF SCIENCE—4.

Adolph P. Andrews, Minneapolis.

B. S. '99, Minnesota.

Major, Physics; Minors, Elect. Eng. Subjects, Mech. Eng. Subjects.

Thesis: The Capacities of Paper Condensers and Telephone Cables.

Elting Houghtaling Comstock,

Minneapolis.

B. S. '97, Wisconsin.

Major, Mathematics; Minors, Applied Mechanics, Mineralogy.

Thesis: Infinite Series.

Vincent Fulkerson, St. Anthony Park.
 B. S. '05, S. D. Agr. College.
 Major, Horticulture; Minors, Agr.
 Chemistry, Thremmatology.
 Thesis: Plant Breeding.
 Roy S. King, Columbus, O.

M. E. '04, Ohio State University.
 Major, Experimental Laboratory; Min-
 ors, Thermodynamics, Gas Engine
 Design.
 Thesis: An Air Compressor Test.

FOR DOCTOR OF PHILOSOPHY—2.

William Macdonald, Pretoria,
 South Africa.
 B. S. '98, Minnesota.
 Major, Agriculture; Minors, Horti-
 culture, Botany.
 Thesis: The Reclamation and Settle-
 ment of Arid Lands.

Anthony Zeleny, Minneapolis.
 B. A. '92, M. S. '93, Minnesota.
 Major, Physics; Minors, Mathematics,
 Chemistry.
 Thesis: The Capacity of the Mica Con-
 denser and its Application as a
 Standard for the Comparison of
 Electrical Quantities.

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

FOR CIVIL ENGINEER—18.

Lewis E. Ashbaugh,
 Colorado Springs, Colo.
 Charles Drewery Batson, St. Paul.
 Hjalmar Frederick Blomquist,
 Stockholm, Wis.
 Clyde M. Cram, Zumbrota.
 Joe Dougherty, Litchfield.
 John A. Dunham, Mason City, Ia.
 James Allen Grant, Windom.
 Fred H. Green, Minneapolis.
 Henry David Haverson, Minneapolis.

Harry Garfield Hawley, Minneapolis.
 Walter Beal Hobart, Minneapolis.
 David Bartholomew Huston,
 Minneapolis.
 Lewis Allen Jones, Mitchell, S. D.
 Earl Wallace Kelly, Duluth.
 Charles August Swenson, Winthrop.
 Mandel George Tondel, Minneapolis.
 Horatio Phillips VanCleve,
 Minneapolis.
 Louis Yager, Minneapolis.

FOR MECHANICAL ENGINEER—17.

Maurice Dwight Bell, Minneapolis.
 Oscar B. Bjorge, Underwood.
 Oliver Lindley Brown, Minneapolis.
 Paul S. Buhl, Graceville.
 Loring Dunham Burwell, Minnetonka.
 E. Franklin Fee, Duluth.
 George Richard Gessert, St. Paul.
 Nicholas A. Gilman, St. Cloud.
 Walter C. Krag, Hampton, Ia.

James M. Meany, Lake City.
 John W. Nekola, LaCrosse.
 Ralph Harvey Rawson, Faribault.
 Willis W. Spring, Minneapolis.
 Elmer Neill Stacy, Eden Prairie.
 Oliver H. Stephenson,
 St. Anthony Park.
 Oliver George Tubby, St. Paul.
 Otto H. Wagner, New Richland.

FOR ELECTRICAL ENGINEER—16.

Herbert Dennett Alton, Ceylon.
 Raymond Joel Andrus, Minneapolis.
 Louis Edward Baer, Kenyon.
 Peter Frederick Countryman,
 Appleton.
 Lynne Walter Eddy, St. Paul.
 Albert Royal Fairchild,
 Grand Forks, N. D.
 Ralph W. Kerns, Minneapolis.
 Arthur Floyd Norcross, Minneapolis.

John Henry Pearce, St. Paul.
 John Joseph Rezab, Winona.
 William P. Schow, Stillwater.
 Byron Elton Smith, Worthington.
 John Edward Smithson, New London.
 Carl Sternberg, Minneapolis.
 George Walter Uzzell,
 Morgan Park, Ill.
 William L. Woehler, Arlington.

THE SCHOOL OF MINES

FOR ENGINEER OF MINES—18

Robert H. Bassett, Minneapolis.
 James Cowin, Minneapolis.
 Silas Lee Gillan, Milwaukee, Wis.
 Charles Freeman Jackson,
 Minneapolis.

Arthur Sturgis McCreery, Northfield.
 Randolph J. McRae, Glencoe, Ontario.
 George Edmund Malcolmson,
 Minneapolis.
 Bartley F. Noehl, Kasson.

Anton Curtiss Oberg, Watertown.	Edgar Wilson Smith, Minneapolis.
Henning E. Olund, St. Paul.	Charles Whyte Steele, Minneapolis.
Walter Huntington Parker, Stillwater.	Karl Phillmore Swenson, Minneapolis.
Elmer A. Probst, Minneapolis.	Michael A. Wiest, Henderson.
Olaf A. Roed, Minneapolis.	Harry M. Ziesemer, Fergus Falls.

THE SCHOOL OF CHEMISTRY

FOR BACHELOR OF SCIENCE (In Chemistry)—5

James Maurice Doran, Winona.	Earle V. Manuel, Minneapolis.
John O. Halvorson, Madella.	Edith I. Von Kuster, Minneapolis.
William Walker Kennedy, Rochester.	

FOR BACHELOR OF SCIENCE (In Chemical Engineering)—1.

Edwin Thomas Davies, Minneapolis.

THE COLLEGE OF AGRICULTURE

FOR BACHELOR OF SCIENCE (In Agriculture)—9.

Phillip T. Allen, Wolverton, N. D.	Herbert Hager Mowry,
Donald S. Blair, St. Anthony Park.	Washington, D. C.
Le Roy Cady, St. Anthony Park.	Max Pfaender, New Ulm.
Carl Gaumnitz, St. Cloud.	John DeCew Rose, Detroit.
Edward Heringa, Fort Collins, Colo.	William Henry Tomhave, Fergus Falls.

FOR BACHELOR OF SCIENCE (In Home Economics)—1

May C. McDonald, Minneapolis.

THE COLLEGE OF LAW

FOR MASTER OF LAWS—4.

Gustavus W. Allen, Minneapolis.	Seth Lundquist, Minneapolis.
LL.B. '06, Minnesota.	LL.B. '06, Minnesota.
Thesis: Philosophy of Jurisprudence.	Thesis: Limits of the Right of Self-Defense.
Josiah H. Chase, Minneapolis.	David R. Thomas, Minneapolis.
B. A. '01, LL. B. '05, Minnesota.	LL.B. '06, Minnesota.
Thesis: Great and Small States.	Thesis: The Consent of the Governed.

FOR BACHELOR OF LAWS—88.

Edmund Pratt Allen, Minneapolis.	Ira Chapman Doane, Minneapolis.
Walter Gilmore Amundson, St. Peter.	William C. Doane, St. Cloud.
Allen P. Asher, Granite Falls.	John H. Eckhardt, Mankato.
John Sumner Barry, Phillips, Wis.	Helmer M. Feroe, Granite Falls.
Otto Baudler, Austin.	Francis Earl Flynn, Minneapolis.
Lewis Williams Bicknell, Minneapolis.	Arthur Russell Folsom, Lake Crystal.
Henry G. Bingham, New Ulm.	Lorenzo J. Gault, Minneapolis.
Elmer Francis Blu, Milford, Ill.	Charles Edwin Gilmore, Lake Crystal.
Edward A. Brekke, Spillville, Ia.	Raymond Milton Gould, Minneapolis.
Percy P. Brush, Minneapolis.	Allen J. Greer, Memphis, Tenn.
William Clark Brooks, Minneapolis.	Rex W. Harris, Webster, S. D.
Harold Delaney Branham,	Harry Roland Hewitt, Minneapolis.
Minneapolis.	Frank A. Jackson, Abbottsford, Wis.
Elof Julius Carlson, Meriden, Ia.	Arthur J. Johnson, Hawley.
Edward L. Casey, Minneapolis.	Joseph T. Johnson, Minneapolis.
Henri Hubert Cloutier, Minneapolis.	John L. Johnston, Little Falls.
Edward St. John Condon,	Cleon T. Knapp, St. Paul.
Minneapolis.	George E. Kremer, Minneapolis.
Clayton C. Cooper, Adrian.	George Sloan Langland, Marshall.
John P. Coleman, Anoka.	Napoleon Alexander L'Herault,
William Page Costello, Graceville.	Minneapolis.
M. E. Culhane, Brookings, S. D.	Elias Johnson Lien, St. Vincent.
David Davis, Duluth.	Erle D. Luce, Minneapolis.
John P. Devaney, Minneapolis.	Edward Everett McHugh, Zumbrota.

Kenneth George McManigal, St. Paul.
 George F. Meader, Minneapolis.
 Walter Henry Murfin, Minneapolis.
 Charles Thomas Murphy, Moorhead.
 Oscar H. Nelson, Minneapolis.
 Clifford N. Nilson, Morris.
 Bernard Anthony Ober, Minneapolis.
 Herbert Thomas Park, Minneapolis.
 Victor Muller Petersen,
 Black River Falls, Wis.
 John O. Peterson, Minneapolis.
 John William Peterson, Montevideo.
 Forest Robert Poppe, St. Paul.
 John E. Ranson, Albert Lea.
 I. Merton Reiff, Minneapolis.
 Howard Gray Richardson,
 Madison, Ind.
 Hugh A. Robertson, Sleepy Eye.
 Howard E. Robinson, Minneapolis.
 Oscar C. Ronken, Ostrander.
 August Savela, Franklin.
 Jacob A. Schaetzel, Minneapolis.
 Josephine Schain, Browns Valley.
 Charles P. Schouten, Lisbon, N. D.
 Rollin H. Schutz, Marshall.
 William A. Schultz, Sleepy Eye.
 Louis L. Schwartz, Minneapolis.
 John A. Sinclair, Duluth.
 Fred Alton Snyder, Austin.
 Charles Murray Stockton, Faribault.
 Ralph Archibald Stone, Morris.
 Gothfred Swante Swanson,
 Minneapolis.
 Melvin J. VanVorst, Paynesville.
 Fernando S. Waddington, Minneapolis.
 Hans Walchli, Kalispell, Mont.
 Cecil E. Warner, Ashville, O.
 Richard S. Wiggin, Minneapolis.
 Wadsworth A. Williams, Minneapolis.
 William Raymond Wells,
 Aberdeen, S. D.
 Harry E. Wheeler, Minneapolis.
 Earl C. Wilmot, Farmington.
 Ray L. Wilson, Minneapolis.
 Herbert Starr Woodward,
 Minneapolis.
 Rees Paul Woodworth, Winona.
 Frank Edward Wright, Minneapolis.

THE DEPARTMENT OF MEDICINE

FOR DOCTOR OF MEDICINE—45.

Alexander Barclay, St. Paul.
 Peter A. Boyum, Rushford.
 Albert J. Chesley, Minneapolis.
 Maurice Dana Cooper, Hopkins.
 Earl H. Current, Minneapolis.
 George Cutts, Minneapolis.
 John M. Egan, Osseo.
 Elmer J. Eklund, Young America.
 Henry I. Emanuel, Milnor, N. D.
 Carl O. Estrem, New London.
 Bainbridge W. Foster, Hector.
 George Jennings, Cavalier, N. D.
 Elmer Mendelssohn Jones,
 Minneapolis.
 Wililam Erastus Judson,
 Forman, N. D.
 Bert R. Karn, Ortonville.
 Carleton Gale Kelsey, Boyero, Colo.
 LaRoy H. Labbitt, Detroit.
 Oscar L. Larsen, River Falls, Wis.
 Jarl F. Lemstrum, Minneapolis.
 Earl Alfred Loomis, Owatonna.
 John F. McGroarty, Inver Grove.
 Mary A. McMillan, St. Peter.
 Clarence Maland, Rushford.
 Thomas Roy Martin, Mantorville.
 Wayne Hamilton May, Moorhead.
 William Arnold Meierding, New Ulm.
 Harold Pederson, Grand Forks, N. D.
 Samuel Benjamin Pond, Minneapolis.
 Frederick H. Poppe, Milbank, S. D.
 Henry William Quist, Chisago City.
 Maritt John Rand, Elk River.
 Charles LeRoy Rodgers, Farmington.
 Ignatius Paul Rosenthal, St. Paul.
 Courtland R. Sanborn, Minneapolis.
 Lee Arbor Scafe, Primghar, Ia.
 Ernest Vernon Smith, Minneapolis.
 Homer Russell Smith, Minneapolis.
 Charles Sidney Stevens, Farmington.
 David M. Strang, Alexandria.
 Moses Lane Strathern, Rich Valley.
 Cephas Swanson, Minneapolis.
 Albert Raymond Varco, Austin.
 Joseph Peter Weyrens, St. Cloud.
 Johan C. Wiik, Minneapolis.
 Alfred Hinks Youngs, Minneapolis.

THE COLLEGE OF DENTISTRY

FOR DOCTOR OF DENTAL SURGERY—30.

Walter Stene Aarnes, Montevideo.
 Owen K. Alrick, Minneapolis.
 Robert Andrew Barnitz, Austin.
 Theodore H. Bauer, Minneapolis.
 Ansel M. Birnberg, St. Paul.
 George H. Borgwardt, Peterson, Ia.
 Archibald B. Butter, Moline, Ill.
 Allen C. Carlaw, Northfield.
 George Myron Damon, Worthington.
 Owen Eugene Doely, Spring Grove.
 Francis Gerald Fitzgerald, Lake City.
 George H. Froelich, Winnebago.
 Knut Arthur Glimme, Minneapolis.
 Charles Arthur Griffith, Hector.
 Orlen C. Helele, St. Paul.
 Edward John Hollern, Sauk Rapids.
 Rolland Ralph Jones, Minneapolis.
 Clyde Luther May, Young America.
 William T. Niemi, Superior, Wis.
 Wright Benton Page, Minneapolis.
 Egbert Ralph Pinney, Mankato.
 Cleveland A. Purdon, Wahpeton, N. D.
 Henry George Ramstead,
 Eau Claire, Wis.
 Charles Rauch, Minneapolis.
 Peter Oscar Rosendahl, Spring Grove.

Oscar Christian Seebach, Red Wing.
Nat Cyrus Smith, Fair Haven.
Thomas Heathcote Thomas,
Spencer, Ia.

Homer Abraham Weaver, St. Paul.
Arthur A. Zierold, Granite Falls.

THE COLLEGE OF PHARMACY
FOR PHARMACEUTICAL CHEMIST—17.

C. Herbert Allen, Minneapolis.
Oscar Blossmo, Menomonie, Wis.
Carl P. Bohland, St. Paul.
John Foster Bolton, Plainview.
Otto H. Brede, Minneapolis.
Charlotte E. Caton, Minneapolis.
Benjamin H. Day, St. Paul.
Bernhard Arthur Deterling, Gaylord.
Henry Gerhardt Egbert, Winona.

George Stevens Hanscom, Willmar.
Roy R. Jamieson, St. Paul.
John A. Knapp, River Falls, Wis.
Ned LeRoy Larson, Atwater.
Ray J. Nott, Brownton.
Frank R. Quick, St. Paul.
Charles A. Thomson, Buffalo.
Floyd E. Turton, Alexandria.



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X STUDENTS

The College of Science, Literature, and the Art:

SENIORS—233

Anderson, Anetta, Estherville, Ia.
Anderson, Frank F., St. Paul.
Anderson, Theodora H., Montevideo.
Anderson, Tryphena, Montevideo.
Armstrong, Mary E., Minneapolis.
Aust, Franz, Minneapolis.
Aygarn, Edwin, Choice.
Aylmer, Albert R., Minneapolis.
Barber, Marlon L., Minneapolis.
Beckman, Emma, Minneapolis.
Benz, Laura, St. Paul.
Billings, Vera D., St. Paul.
Blanchard, Naneen M., St. Paul.
Bland, Guy C., Anoka.
Blossom, Nina M., St. Paul.
Brainerd, Rena C., Blooming Prairie.
Breen, Elizabeth M., St. Paul.
Brewster, Grace, Mankato.
Brock, Emma L., St. Paul.
Brown, Mildred, Minneapolis.
Bruce, Ellen M., St. Paul.
Bruchholz, Elizabeth, Minneapolis.
Buchanan, Margaret M., Minneapolis.
Cannon, Raymond C., Watertown, S. D.
Casey, Catherine, St. Paul.
Cater, Louise, St. Cloud.
Clark, Miriam, Minneapolis.
Cliff, Howard J., Ortonville.
Clough, Lee, Minneapolis.
Colgrove, Vivian G., Minneapolis.
Colter, Lillian E., St. Paul.
Colter, Ruth M., St. Paul.
Craven, Jennie G., Faribault.
Crawford, William H., Minneapolis.
Crosby, Walter B., Willmar.
Cummings, Helen S., St. Paul.
Cuzner, Fay, Minneapolis.
Davenport, John E., Fairfield.
Day, Juanita, St. Paul.
Deal, Florence D., Truman.
Deering, Harold C., Minneapolis.
Deering, Robert L., Minneapolis.
Denfeld, Margaret, Duluth.
Dougherty, Kathryn, Mankato.
Dowdall, Augustus S., Minneapolis.
Doyle, Anastasia, St. Paul.
Dunlvon, Nellie, St. Paul.
Duxbury, Lloyd L., Caledonia.
Ebeltoft, Carl T., Lake Park.
Edwards, Marjorie, Minneapolis.
Eklund, Edwin G., Moorhead.
Elliott, Grace J., Minneapolis.
Elmqvist, Elmer W., St. Paul.
Elwell, Margaret A., Minneapolis.
Enegren, Cecile L., Minneapolis.
Evans, Albert G., Duluth.
Faegre, Minnie, Flandreau, S. D.
Farwell, Edith L., Zumbrota.
Feeny, Agnes E., St. Paul.
Fellows, Murlen, Minneapolis.
Finch, Alice M., Clinton Falls.
Firmin, Kate M., Minneapolis.
Fleming, Beryl, St. Paul.
Fleming, Lou B., St. Paul.
Fletcher, Ruby H., Minneapolis.
Fletcher, Victor W., Farmington.
Fligelman, Leah, Minneapolis.
Gaghagen, Grace L., Minneapolis.
Gessell, Walter J., Heron Lake.
Gilbertson, Albert N., Willmar.
Gippe, Louise, Watson.
Gleason, Caroline J., Minneapolis.
Goddard, Jessie C., Minneapolis.
Godley, Florence, Minneapolis.
Gordinier, Fannie, St. Paul.
Greeley, Kate, Stillwater.
Green, Alice E., Minneapolis.
Grime, Florence L., Minneapolis.
Halvorson, Ella J., Dawson.
Hansen, Thorwald, Benson.
Harter, Clarence M., Minneapolis.
Hartson, Daisy J., Minneapolis.
Haynes, Jack E., St. Paul.
Hille, Julie, Fergus Falls.
Hillesheim, Emma M., Sleepy Ey
Hitchings, Vinnie, Sutherland, Ia.
Hoffmann, Minnie C., St. Paul.
Holen, Julia, Minneapolis.
Hopkins, Lorena, Minneapolis.
Hovey, Inez I., Minneapolis.
Howe, Ida E., St. Anthony Park.
Hubbard, William A., Minneapolis.
Hutchinson, Lara C., Minneapolis.
Inglis, Rewey Belle, Minneapolis.
Jenks, Florence K., Minneapolis.
Johnson, Anna J., Minneapolis.
Johnson, Anna M., Crookston.
Johnson, Edward W., Rockford.
Johnson, Guy C., Minneapolis.
Johnson, Jay G., Minneapolis.
Johnson, Ruth, Minneapolis.
Johnson, Thekla E., Lake City.
Jones, Florence, Gaylord.
Jones, William M., Minneapolis.
Keating, Monica C., St. Paul.
Kelly, Margaret, St. Paul.
Kennedy, Anne, St. Paul.
Kingsley, Grace M., Minneapolis.
Knight, Ralph T., Minneapolis.
Koessler, Rudolph E., Heron Lake.
La Due, Mabel, Minneapolis.
Laybourn, Hortense, Minneapolis.

Leavenworth, Louise, Minneapolis.
 Leck, Bertha, Owatonna.
 Levin, Harriet E., Aurora.
 Lewis, Margolee, St. Paul.
 Lien, Arnold J., Delevan.
 Lillehei, Ingebright, Luverne.
 Linnan, Margaret, St. Paul.
 Lockman, Jessie F., Minneapolis.
 Lougee, Clare L., Minneapolis.
 Lucas, Mary A., Minneapolis.
 Lumley, Stella, Minneapolis.
 Lunn, Joseph E., Carleton.
 Lyon, Mabel E., Hastings.
 Lyon, Maude H., Hastings.
 McGarvey, George A., Minneapolis.
 McGrew, Dana, Howard Lake.
 McGuigan, Dora, Millville.
 MacKenzie, Harriett M., Minneapolis.
 Mansfield, Mabel, Minneapolis.
 Marsh, Jessie M., Claremont.
 Marshall, Sara, Minneapolis.
 Martens, Josephine, Minneapolis.
 Meech, Robert L., Minneapolis.
 Melony, Alice F., Minneapolis.
 Mikesh, James S., Spillville, Ia.
 Miller, Hilda, St. Paul.
 Millie, Mabel F., Minneapolis.
 Moore, Harriet D., St. Paul.
 Morse, Arthur A., Minneapolis.
 Mottley, F. Wilbur, Red Wing.
 Nesta, Elmina R., Minneapolis.
 Newton, Mary M., St. Paul.
 Nordbergh, Marion, Minneapolis.
 Nordin, Elsa R., St. Paul.
 Norlander, Inez J. F., St. Paul.
 O'Brien, Emma F., St. Paul.
 Oakes, Reuben W., Worthington.
 Olson, Didrick J., Bellevue.
 Olson, Mathias N., Bellevue.
 Osla, Catherine, Minneapolis.
 Ott, Hildegard L. E., Minneapolis.
 Palmer, Andrew H., Minneapolis.
 Paul, Florence E., Minneapolis.
 Pennington, Hazel M., St. Paul.
 Peterson, Albert S., Wheaton.
 Peterson, Cora A., Elbow Lake.
 Peterson, Paul W., Minneapolis.
 Pettersen, Bernard, Madelia.
 Phelps, Aura I., Minneapolis.
 Pickler, Alfred A., Faulkton.
 Plummer, Lillian, Minneapolis.
 Polley, Grace E., Grand Rapids.
 Pope, Alice G., Minneapolis.
 Putnam, Alice E., Minneapolis.
 Ray, John H., Jr., Minneapolis.
 Remer, Charles F., Minneapolis.
 *Richmond, Margaret, Minneapolis.
 Rittenhouse, Catherine, Minneapolis.
 Robb, Walter C., Minneapolis.
 Rosdahl, Signe A., Wheaton.
 *Died, 1907.

Rossman, Claude W., Minneapolis.
 Rouse, Honore V., Minneapolis.
 Rowberg, Herbert C., Hanley Falls.
 Runey, Madge, Minneapolis.
 Sachs, Gustave M., New Prague.
 Safford, Oren E., Aitkin.
 Salisbury, Maurice E., Minneapolis.
 Sanford, LeRoy W., Minneapolis.
 Saterlie, Julia K., Milan.
 Sawyer, Alma P., Minneapolis.
 Schaetzel, Mina, Minneapolis.
 Schmidt, Pauline, Minneapolis.
 Schneiderhan, Albert G., Jordan.
 Schons, Emily, St. Paul.
 Schow, Susie S., Minneapolis.
 Schroeder, Florence, Perham.
 Seaton, Fay N., Minneapolis.
 Sevaton, Ella, Windom.
 Shadewald, Elsie A., Minneapolis.
 Shaw, Wilbur D., Minneapolis.
 Shiely, Mary E., St. Paul.
 Simerman, Helen, St. Paul.
 Sly, Florence A., Minneapolis.
 Smith, Anna M., Minneapolis.
 Smith, Harriet L., Minneapolis.
 Smith, Irma P., Minneapolis.
 Smith, J. Russell, Minneapolis.
 Smith, Winifred R., Duluth.
 Solensten, Rudolph T., Minneapolis.
 Stake, Alma L., Anoka.
 Sterling, Georgina, Red Wing.
 Stewart, Dorothea, Minneapolis.
 Stewart, Edna, Minneapolis.
 Streissguth, Thomas O., Arlington.
 Sveeggen, Peter A., Minneapolis.
 Swan, James E., Mankato.
 Swanstrom, Henry, Lake Park.
 Switzer, Abbie D., Minneapolis.
 Thompson, Della F., Minneapolis.
 Thompson, Gertrude M., Minneapolis.
 Thorson, Ella B., Winthrop.
 Trimble, Margaret, Minneapolis.
 Van Rhee, George J., Milaca.
 Waddell, Mamie E., St. Louis Park.
 Walker, Margaret E., Williston, N. D.
 Walston, Genevieve, Minneapolis.
 Wasser, Ruby S., Minneapolis.
 Watson, Alice A., St. Paul.
 Weinstein, Freda, Helena, Mont.
 Whitney, Helen, Minneapolis.
 Whittle, Anna, Minneapolis.
 Whittle, Sadye, Minneapolis.
 Wiggen, Charlotte A., Red Wing.
 Wilder, Susan, Minneapolis.
 Williams, Beatrice I., Minneapolis.
 Williams, Mary L., Cedar Lake.
 Wilson, Chester S., Stillwater.
 Wolfe, Elizabeth, Ruthton.
 Woodke, Luella, Le Mars, Iowa.
 Yerxa, Elizabeth, Minneapolis.
 Ziegler, Augusta G., Minneapolis.

JUNIORS—242

Acomb, Marie R., Minneapolis.
 Adams, C. Roy, Austin.
 Ahlquist, Perry K., North St. Paul.
 Altenburg, Carl L., Wells.
 Anderson, Carl A., Hutchinson.
 Anderson, Herbert I., Goodhue.

Anderson, Roscoe B., Minneapolis.
 Austin, Alice, Minneapolis.
 Babcock, Fager M., Minneapolis.
 Baillif, Matilda, Osakis.
 Bakalyar, George, Lakefield.
 Balcom, Winfred G., Chatfield.

Bardsley, Myrtle, Duluth.
 Beals, James B., Minneapolis.
 Beardsley, Edythe, Hibbing.
 Beck, Clara L., St. Paul.
 Bell, Grace, St. Paul.
 Bennett, Lillian, Madison.
 Berchem, Pauline J., St. Paul.
 Berger, Nanda M., St. Paul.
 Bibb, Frank L., Minneapolis.
 Bickford, E. Abbi, Battle Lake.
 Birkenhauer, Mary G., Minneapolis.
 Blakey, Roy, Minneapolis.
 Blanchett, Frederic J., Elk River.
 Bredvold, Louis, Belview.
 Briggs, Florence M., St. Paul.
 Brink, Irma, Minneapolis.
 Brooks, Frank N., Minneapolis.
 Brown, Caro, Minneapolis.
 Brown, Mayme E., Granite Falls.
 Bruhn, Louise H., Minneapolis.
 Burgan, Myrle E., Minneapolis.
 Burk, Ellen I., Minneapolis.
 Burns, Margaret F., Graceville.
 Buswell, Claire, St. Paul.
 Cant, Harold G., Duluth.
 Carlson, Anna C., St. Cloud.
 Carlson, Charles E., Albert Lea.
 Cassidy, Anna C., Eyota.
 Chase, Marjorie C., Minneapolis.
 Child, Emily, Minneapolis.
 Child, Sherman, Minneapolis.
 Christensen, O. Amelia, Minneapolis.
 Churchill, Alta P., Minneapolis.
 Colburn, Algernon O., Minneapolis.
 Connelly, John, Savage.
 Conway, Ethelyn, Detroit.
 Cosgrove, Ethel C.,

State Fair Grounds.

Crozler, Lulu H., Minneapolis.
 Dahleen, Harry W., Maynard.
 Dale, Ludwig S., Minneapolis.
 Danielson, Jessie L., Litchfield.
 Davidson, Hazel B., Minneapolis.
 Davis, Alfred, Minneapolis.
 Davis, William E. C., Minneapolis.
 Dellinger, Virginia E., St. Paul.
 Deming, Portia C., Minneapolis.
 Diamond, Lewis S., Mankato.
 Dickerson, Helen, Minneapolis.
 Dinsmoor, Viola C., Austin.
 Dunning, Frances D., Minneapolis.
 Duvigneaud, Jeanette, Minneapolis.
 Eddy, Beatrice E., Minneapolis.
 Engle, Marguerite, Minneapolis.
 Engstrom, Lillian F., Minneapolis.
 Erickson, Jennie S., Anoka.
 Ewy, Edwin W., Butterfield.
 Finkle, Lillian S., Minneapolis.
 Ford, Gertrude, St. Paul.
 Foulke, Robert W., St. Paul.
 Fraiken, Wanda, Minneapolis.
 Francis, Helen E., St. Paul.
 Franklin, Laura G., Blue Earth.
 Freligh, Wilfred P., Stillwater.
 French, Anna M., Minneapolis.
 French, Lafayette, Austin.
 Frenzel, Rose M., St. Paul.
 Gardner, Alice, Minneapolis.
 Gansemel, Arthur N., Kenyon.
 Gilbert, Grace E., St. Paul.

Gould, Marian R., Minneapolis.
 Grimes, Gordon, Minneapolis.
 Hale, Beatrice E., Spring Valley.
 Hallock, Mary J., Duluth.
 Hanaford, A. Ruth, Minneapolis.
 Hanratty, Catherine, Graceville.
 Hanson, Bertha Mary C., Minneapolis.
 Harding, Fred A., Minneapolis.
 Harrison, Ruth, Minneapolis.
 Hart, Una M., Anoka.
 Hellickson, Blanche, Mabel.
 Herum, Helen, Minneapolis.
 Hess, Charles L., Sleepy Eye.
 Hewitt, Marie Alden, Minneapolis.
 Hill, Clarence E., Minneapolis.
 Hixon, Agnes, Minneapolis.
 Hoag, Richard L., Minneapolis.
 Holcomb, Dora M., Warren.
 Holm, Eva C., Stillwater.
 Holt, Blanche M., Minneapolis.
 Hoovel, Violet S., Minneapolis.
 Hovey, Albert P., Minneapolis.
 Hudson, Neva B., Minneapolis.
 Hull, Harold J., Wahpeton, N. D.
 Hull, Mabel B., Litchfield.
 Hull, William M., Minneapolis.
 Hunt, Thomas F., Le Sueur Centre.
 Jackson, Mabel C., St. Paul.
 Jenness, Maurice V., Willmar.
 Jensen, Louise, Minneapolis.
 Johnson, Esther C., Minneapolis.
 Kelley, Frances R., Minneapolis.
 Kessel, Martha C., Cresco, Ia.
 Kline, Gertrude, Minneapolis.
 Knutson, Dagny, St. Cloud.
 Kreis, Cora, Monticello.
 Krueger, Richard G., Bellingham.
 Kuethe, Emma S., Preston.
 Lambert, Percy, Sauk Centre.
 Lambie, Ethel L., Minneapolis.
 Lawton, George T., Minneapolis.
 Leach, Grace, Spring Valley.
 Lees, Millicent, Minneapolis.
 Leland, Rosamond, Minneapolis.
 Leonard, Elva L., Minneapolis.
 Leslie, Ruth, Minneapolis.
 Leuthold, Walter M., Minneapolis.
 Leveroos, Ethel, Minneapolis.
 Leviston, Alice M., St. Paul.
 Lewis, E. Genevieve, Minneapolis.
 Longstaff, Wm., Huron, S. D.
 Lovick, Paul J., Minneapolis.
 Lowenthal, Max, Minneapolis.
 Lyeon, Donna M., Bemidji.
 McFetridge, Auverne, St. Paul.
 McIvor, Helen L., St. Paul.
 McKennan, Pearl G., Minneapolis.
 McQuat, Frances M., Minneapolis.
 Mabie, Harriet, Minneapolis.
 Maland, Joseph O., Elmore.
 Mallory, Walter, St. Paul.
 Manderfeld, Cornelia B., Minneapolis.
 Matson, Charlotte, Minneapolis.
 Maul, Earl C., Minneapolis.
 Mecklenburg, George, Cedar.
 Melin, E. Luther, Minneapolis.
 Miles, Word C., Minneapolis.
 Mooney, Florence H., Duluth.
 Moore, Edna, St. Paul.
 Mouser, Carl B., Minneapolis.

Mousley, Josephine, Litchfield.
 Munro, Margaret H., Minneapolis.
 Murfin, Jennie, Minneapolis.
 Neils, Walter E., Cass Lake.
 Nelson, Anna L.
 Nelson, Robert, Minneapolis.
 Nielsen, Marie B., St. Paul.
 Norelius, Wm. A., Luverne.
 Norris, Sadie A., Minneapolis.
 Norton, Wm. W., Minneapolis.
 Nystrom, Hilda, Minneapolis.
 Olsen, Clare, Minneapolis.
 Olsgard, Constance, Minneapolis.
 Ostby, Gena, Minneapolis.
 Overn, Orlando, Albert Lea.
 Overpeck, Nell, St. Paul.
 Palmer, Alice H., Minneapolis.
 Palms, Edith, Minneapolis.
 Pidgeon, Vernon C., Minneapolis.
 Pitblado, Annie, Minneapolis.
 Ponthan, Marie W., St. Paul.
 Potter, Zenas L., Minneapolis.
 Putnam, Gladys, Minneapolis.
 Quigley, Alice R., Bird Island.
 Quigley, Catherine, Bird Island.
 Reely, Stella Anne, Minneapolis.
 Rehnke, Edgar B., Minneapolis.
 Reid, Harry C., Sleepy Eye.
 Rice, Mary G., Minneapolis.
 Richards, Grace E., Minneapolis.
 Riheldaffer, Helen, Minneapolis.
 Ringsred, Ruth E., Duluth.
 Robertson, William P., Litchfield.
 Robinson, Fred H., Scobey, Mont.
 Rockwood, Edith, Minneapolis.
 Rossman, Harold, St. Paul.
 Rothrick, H. B., Winona.
 Roverud, Nora, Caledonia.
 Rowe, Elsie, Minneapolis.
 Ruger, Rosa C., Minneapolis.
 St. Amour, Ruby C., Minneapolis.
 Salisbury, Eva, Minneapolis.
 Scharf, A. L., Minneapolis.
 Schriber, Alice E., St. Paul.
 Schroeder, Anna T., Perham.

Seaman, Susie, Minneapolis.
 Shanley, Helen M., St. Paul.
 Shepardson, Elizabeth, Minneapolis.
 Shonts, Mary O., Fergus Falls.
 Simmons, Juliet, Hunter, N. D.
 Simms, Marjorie, Minneapolis.
 Sinclair, Catherine, Fairmont.
 Sleeper, Raymond A., Sheldon, Ia.
 Smiley, William Yale, Minneapolis.
 Smith, Audrey N., Minneapolis.
 Smith, Corinne J., St. Paul.
 Smith, Marjorie, Minneapolis.
 Snyder, Maybelle, Minneapolis.
 Solon, Lorraine, Minneapolis.
 Spear, Florence, Minneapolis.
 Spink, Helen E., White Bear.
 Stegner, Hope A., St. Paul.
 Stork, Allen B., Harmony.
 Strate, Clara, Moorhead.
 Strongren, Lucia, Center City.
 Sturtevant, Abby, Minneapolis.
 Svensrud, Ida, Minneapolis.
 Tallant, Ruth L., Minneapolis.
 Tanikawa, Yoshio, Tsu Ise, Japan.
 Todd, Erma E., Minneapolis.
 Toomey, Mary, St. Paul.
 Trask, Bertha M., Herman.
 Turnbull, Lloyd W., Minneapolis.
 Ueland, Elsa, Minneapolis.
 Uzzell, Thomas H., Morgan Park,
 Chicago, Ill.
 Van Slyke, Lois C., Minneapolis.
 Waite, Camella, Minneapolis.
 Wales, Geneve, Minneapolis.
 Wedge, Vera E., Zumbrota.
 Weese, Asa O., Hutchinson.
 Welch, Louise, St. Paul.
 Weld, Helen, Minneapolis.
 Whaley, Amanda M., St. Paul.
 Wigforss, Nanna, Red Wing.
 Willits, Nettie, Sioux Falls, S. D.
 Wilson, Clyde H., Minneapolis.
 Woolsey, Leona, Minneapolis.
 Yates, Fanny A., St. Paul.
 Yeaton, Walter J., Minneapolis.

SOPHOMORES—320

Aichele, Johanna, St. Paul.
 Ainsworth, Charles L.,
 Chippewa Falls, Wis.
 Akerson, George E., Minneapolis.
 Allen, Jennie E., Minneapolis.
 Amundsen, Albert E., St. Paul.
 Anderberg, Irene A., Sisseton, S. D.
 Anderson, Clara S., Milan.
 Anderson, Walter E., Stillwater.
 Andrews, Dalton M., St. Paul.
 Bamber, Carlotta, Rochester.
 Barclay, Luvia, Minneapolis.
 Barke, Arthur R., Fergus Falls.
 Barlow, Frank, Kasson.
 Barr, Jean B., Minneapolis.
 Bell, Julia B., Minneapolis.
 Benson, Eva, Maple Plain.
 Berrisford, Mercedes, St. Paul.
 Berrisford, Paul D., St. Paul.
 Bethke, William, Franklin.
 Bookwalter, Hazel, Minneapolis.
 Bowen, Mercy H., St. Paul.

Boyes, Earle, Spring Valley.
 Boyson, Maybelle, Minneapolis.
 Brackett, Helen L., Charles City, Ia.
 Brezler, Anna P., Anoka.
 Brigham, Helen, Minneapolis.
 Brinsmaid, Martha M., Minneapolis.
 Brown, Edna M., Minneapolis.
 Brown, Thirza, Minneapolis.
 Browne, Marie, Minneapolis.
 Bruce, Edna A., Minneapolis.
 Buck, Florence, Minneapolis.
 Burton, Lois L., Alden.
 Buswell, Arthur M., Minneapolis.
 Butler, Florence, Winona.
 Caldwell, Josephine, St. Paul.
 Cameron, Bula, Wahpeton, N. D.
 Cammack, William R., St. Paul.
 Campbell, Hugh B., Stillwater.
 Campbell, Stella, Tracy.
 Carleton, George, Minneapolis.
 Carlson, C. Arthur, Minneapolis.
 Carlson, Esther E., Minneapolis.

- Carlson, Ethyl Belle, Minneapolis.
 Cawley, Charles J., Minneapolis.
 Cawley, F. Stanton, Minneapolis.
 Chance, Harold K., Minneapolis.
 Chenery, Isabella, Jamestown, N. D.
 Clapp, Ella, St. Paul.
 Clark, Harriet O., Minneapolis.
 Clendening, Gladys, Minneapolis.
 Clifford, C. May, West Concord.
 Clouston, Edith, Minneapolis.
 Coleman, Myrtle, Minnetonka Beach.
 Collier, Frances L., Minneapolis.
 Collins, Lucile, Minneapolis.
 Collins, Thos. J., Minneapolis.
 Comstock, Belle May, St. Paul.
 Confer, L. Marie, Minneapolis.
 Cook, Lillian E., Nerthome.
 Coon, Chauncey C., Minneapolis.
 Cowling, Helen, Ely.
 Cram, Walter, Minneapolis.
 Crawford, Ruth, Minneapolis.
 Critchett, Francis E., New Ulm.
 Crittenden, Ethel, Minneapolis.
 Crocker, Katherine, Minneapolis.
 Crogan, Mattie, Minneapolis.
 Currie, Helen H., Minneapolis.
 Curtis, Josephine, Minneapolis.
 Cutler, Mary E., Minneapolis.
 Dahl, Olga, Minneapolis.
 Davis, Homer, Dickinson, N. D.
 Dedolph, Theodore, St. Paul.
 Dix, Gertrude Ethel, Minneapolis.
 Dodge, George P., Minneapolis.
 Donaghue, Belle, Minneapolis.
 Donahoe, Stephen A.,
 Hot Springs, S. D.
 Donohue, Gertrude, Minneapolis.
 Dorsey, Cora, Minneapolis.
 Dorsey, James E., Minneapolis.
 Douglas, Leila, St. Paul.
 Downey, Vina K., Minneapolis.
 Duxbury, Leland S., Caledonia.
 Eakins, Bessie, Gary, S. D.
 Eckholdt, Laura B., Minneapolis.
 Eddy, Helen F., Minneapolis.
 Eenkema, Katherine, Clara City.
 Eidsmoe, Sever B., Minneapolis.
 Eisengraeber, Gustav, St. Paul.
 Elke, Estella L., Chaska.
 Ellis, Lynn, Minneapolis.
 Elmquist, Marie, St. Paul.
 Elwell, Georgia B., Minneapolis.
 Engson, Edward, Hallock.
 Erdall, Agnes R., St. Paul.
 Erdall, Leonard T., St. Paul.
 Erickson, Hilma E., Alexandria.
 Evans, Nevada S., Minneapolis.
 Fagerstrom, Albert H., Minneapolis.
 Fagundus, Ruth, Minneapolis.
 Ferguson, Clare, Minneapolis.
 Feton, Augusta A., Canby.
 Fisher, Harold C., Minneapolis.
 Fiske, Cyrus H., St. Paul.
 Fitzsimmons, Mary A., St. Paul.
 Fluke, Helen, Akeley.
 Foley, Mabel M., Minneapolis.
 Freeman, Howard H., Washburn Park.
 Fritzberg, Huldah, Biwabik.
 Gaylord, Robert M., Minneapolis.
 Gibbs, Velzora A., Waterville.
 Gilger, Bessie, Minneapolis.
 Giltinan, Eleanor, Minneapolis.
 Goldsmith, G. W., Hutchinson.
 Gould, Anna M., Glencoe.
 Graham, Reginald D., West Duluth.
 Grapes, Iva, Adrian.
 Green, Ethelinda B., Stillwater.
 Gullickson, Glenn, Minneapolis.
 Gundersen, Margaret E., Minneapolis.
 Gurley, George P., Minneapolis.
 Hague, Gertrude M., Minneapolis.
 Haines, Helen B., Minneapolis.
 Hall, Ruth M., St. Paul.
 Halvorson, Gustav, Minneapolis.
 Hamilton, Carl L., Dubuque, Ia.
 Hamilton, William J., Minneapolis.
 Hammond, Eva G., Minneapolis.
 Hankey, Clara, Minneapolis.
 Hanson, Minnie O., Morris.
 Hardick, Florence, St. Paul.
 Harms, Samuel F., Norwood.
 Haupt, Mary C., St. Paul.
 Hayes, Mary C., Minneapolis.
 Heneman, Herbert, Lester Prairie.
 Heritage, Mary Hill, Minneapolis.
 Herring, Hazle S., Riceville, Ia.
 Hobbs, Marabeth, Minneapolis.
 Hodgson, Marie, Minneapolis.
 Hoffmann, Pauline, St. Paul.
 Holm, Gustave S., Minneapolis.
 Hudson, Mabelle, Minneapolis.
 Hutchinson, Enid M., Minneapolis.
 Jacobsen, Nora, Luverne.
 Jewett, Helen E., Fergus Falls.
 Johnson, Ella, Winona.
 Johnson, Fred R., New Richland.
 Johnson, Freda D., St. Paul.
 Johnson, Jennie, Excelsior.
 Johnson, Marie, Minneapolis.
 Johnson, Millie E., Minneapolis.
 Kelley, Aris R., Minneapolis.
 Kellogg, Ada B., St. Paul.
 Kemp, Etheleen, Minneapolis.
 Kent, Fay, Minneapolis.
 Kepner, Ben Hur, Appleton.
 Kimball, Ruth A., Minneapolis.
 King, James C., Minneapolis.
 Kling, David T., Donnelly.
 Koerner, Ila, St. Paul.
 Lampert, Edna, Minneapolis.
 Lane, Anna M., St. Paul.
 Larrabee, Walter F., Minneapolis.
 Lathrop, Elsie L., Minneapolis.
 Laughlin, Vera M., Eau Claire, Wis.
 Lawler, Frank J., Minneapolis.
 Lawrence, Marion, Minneapolis.
 Lenart, Elta, Minneapolis.
 Leonard, F. Perry, Minneapolis.
 Lia, Alma, Hancock.
 Lien, Luella C., Granite Falls.
 Lloyd, Frances H., St. Paul.
 Long, Will H., Elysian.
 Loomis, Veda, Minneapolis.
 Losse, Hyme, Minneapolis.
 Lucker, Edith M., Minneapolis.
 Lundeen, Marie, Minneapolis.
 Lydon, Helen, Minneapolis.
 Lyford, Stella E., Minneapolis.

- Lyon, Mary Anna, Minneapolis.
 McDermott, Joseph C., Clontarf.
 McKenzie, Harriet E., Lake Benton.
 McKenzie, John, Jr., Lake Benton.
 MacLagan, Bonnie, St. Paul.
 McMillan, Effie, Luverne.
 *McNutt, Rebecca, Algona, Ia.
 McRostie, Wm. Morris, Lake City.
 Maloy, Agnes C., St. Cloud.
 Marden, Irene, Barnesville.
 Markham, Royal E., Rush City.
 Martindale, Bess, Litchfield.
 Mathes, Florence, St. Paul.
 Merrill, Robert C., Minneapolis.
 Miller, Arleigh R., Minneapolis.
 Miller, Jensine, Minneapolis.
 Miller, Lillian G., Minneapolis.
 Molenaar, Richard, Raymond.
 Montgomery, John, Minneapolis.
 Moriguchi, Saitchi, Minneapolis.
 Munck, Harold, Owatonna.
 Murseth, M. Lillian, Minneapolis.
 Naeve, Edith A., Minneapolis.
 Nelson, Edna C., Red Wing.
 Nelson, Herbert, Minneapolis.
 Nelson, O. Norman, St. Paul.
 Nesse, James N., Mabel.
 Newhall, Richard A., Minneapolis.
 Newton, Caroline, Minneapolis.
 Nichols, Marjorie P., Pipestone.
 Nickell, Marlon, Minneapolis.
 Nienhauser, Roy B., St. Paul.
 Nixon, Hugh H., Wells.
 Nordley, Harry, Minneapolis.
 Nutter, Hannah, Minneapolis.
 Nye, Katherine A., Minneapolis.
 Ober, Mary L., Duluth.
 Olsen, Phoebe M., Minneapolis.
 Olsgard, Eugene, Minneapolis.
 Olson, Mary D., Lake Park.
 Ovestrud, Edmund, Spring Grove.
 Paddock, Laura, Minneapolis.
 Painter, Helen D., Minneapolis.
 Parkell, Irene M., Minneapolis.
 Parker, Alonzo E., North Branch, Ia.
 Peterson, Celius, Mabel.
 Peterson, Ernest A., Albert Lea.
 Pettersen, Huldah O., Madelia.
 Pinkus, Olga, St. Paul.
 Pitts, Eva L., Alton, Ia.
 Pomeroy, Eunice, Minneapolis.
 Prime, Ruth, Minneapolis.
 Probst, Ilse G., St. Paul.
 Putnam, Leslie R., Minneapolis.
 Race, Adah M., Minneapolis.
 Ramsey, Grace, Minneapolis.
 Ramsland, Rudolph J., Sacred Heart.
 Rankin, Edward P., Jamestown, N. D.
 Reed, Abbie N., Minneapolis.
 Reed, Ethel E., Minneapolis.
 Reum, Arthur W., Minneapolis.
 Rickard, Marian, Minneapolis.
 Ringdahl, N. Robert, Minneapolis.
 Ripley, Ava A., Minneapolis.
 Robbins, Esther M., Robbinsdale.
 Roberts, Marjorie, Minneapolis.
 Roberts, Thomas C., Minneapolis.
 Robinson, Sarah, Minneapolis.
 *Died March 31, 1908.
 Rogers, Caroline E., Minneapolis.
 Rossi, Julia, Mantorville.
 Rowe, Ina, Minneapolis.
 Sackett, Ina P., Minneapolis.
 Salzer, Helen C., Minneapolis.
 Schaller, Karl A., Hastings.
 Schneider, Jessie J., Minneapolis.
 Schulte, Henry, Plato.
 Schutte, Helen, St. Paul.
 Seabury, Paul R., St. Paul.
 Sedgwick, Fred G., Minneapolis.
 Sefton, Adel, St. Paul.
 Sell, Erna I., Fairfax.
 Shellenberger, Olive W., St. Paul.
 Shook, Margaret M., Northome.
 Simmons, Marjorie M., Hunter, N. D.
 Sinclair, Myra Jean, Minneapolis.
 Sinderson, Grace, Minneapolis.
 Skartum, Bess, Lake Benton.
 Skoglund, Alma G., North St. Paul.
 Sly, Gertrude B., Minneapolis.
 Smart, Alice L., Minneapolis.
 Smart, Anna A., Minneapolis.
 Smith, A. Blanche, Rochester.
 Smith, Eunice H., Minneapolis.
 Smith, Maude M., Miles City, Mont.
 Snere, Irma L., Minneapolis.
 Soloway, Paul S., Minneapolis.
 Souba, Lucie, Hopkins.
 Spain, Lillian, Minneapolis.
 Spring, Arthur D., Minneapolis.
 Starr, Elizabeth, Deephaven.
 Stoft, Esther, Minneapolis.
 Stratton, Ethel, Minneapolis.
 Strong, Louise A., Minneapolis.
 Sumpter, Arlo M., Le Roy.
 Sutton, Pearl G., Stillwater.
 Swanson, Gertrude M., St. Paul.
 Swedberg, Luella C., Luverne.
 Swinburne, Gertrude, Minneapolis.
 Tate, Elizabeth, Faribault.
 Tebbets, Marion, Minneapolis.
 Thompson, Susan B., Minneapolis.
 Thomson, Theodore W., Minneapolis.
 Thuet, Julia, Minneapolis.
 Tillotson, Alice, Minneapolis.
 Tisdale, Mary Vaill, Slayton.
 Tornstrom, Mary, Stillwater.
 Toupin, Joseph A., Red Lake Falls.
 Turner, Winifred E., Minneapolis.
 Turnquist, Florence, Minneapolis.
 Utendorfer, George W., Gaylord.
 Vance, Erskine W., Crookston.
 VanderHiden, Alice, St. Paul.
 Ware, Elizabeth R., Minneapolis.
 Ware, Frederick W., Minneapolis.
 Warren, Jessie A., Minneapolis.
 Wash, Allan J., Minneapolis.
 Watson, Anna, St. Paul.
 Webster, Jennie, Minneapolis.
 Wenberg, Ernest A., Calumet, Mich.
 Wessberg, May, Fergus Falls.
 White, Lucy J., Luverne.
 Williams, Charles A., Luverne.
 Williams, Howard, Minneapolis.
 Wingate, John, Minneapolis.
 Winterer, Florence, Valley City, N. D.
 Winterquist, Albert L., Little Falls.

Witchie, Hazel M., Minneapolis.
Woodis, Clark N., Amboy.

Wretling, Hilma E., Alexandria.
Yorke, Georgia M., Minneapolis.

FRESHMEN—446

Ainsworth, Caroline, Minneapolis.
Allen, Arthur E., Minneapolis.
Allen, William L., Minneapolis.
Ames, Georgiana, Minneapolis.
Amundson, Mark H., Alexandria.
Amy, Helen L., Minneapolis.
Anderson, Alice E., Minneapolis.
Anderson, Hilda A., St. Paul.
Anderson, Joseph Elmer, Amboy.
Anderson, Marie L., Minneapolis.
Applebee, Ruby M., Anoka.
Arnold, Benjamin E., Brainerd.
Avis, Samuel Lee, Jamestown, N. D.
Ayers, Grace F., Minneapolis.
Babcock, Lana, Minneapolis.
Baillie, James G., Virginia.
Barber, Ralph, Long Prairie.
Bathhurst, John, Minneapolis.
Beddall, Claude R., Ellsworth, Wis.
Beeman, Elna, Minneapolis.
Bell, Edward E., Minneapolis.
Bell, Ruth, Minneapolis.
Benoit, Albert, Crookston.
Bergh, Gertrude, Kerkhoven.
Bernhagen, Clara H., Minneapolis.
Bieber, Louise, Minneapolis.
Billau, Helen, St. Paul.
Bingen, Wm. I., Webster, S. D.
Blake, Frances E., St. Paul.
Bobb, Bessie E., Minneapolis.
Boland, George H., St. Paul.
Bolstad, Sigvard, Dawson.
Bonniwell, Donna, Minneapolis.
Borden, Ethel, Minneapolis.
Bowman, Clementine, Howard Lake.
Boyd, George, Monticello.
Boyd, Susan E., Minneapolis.
Braden, Elizabeth, Minneapolis.
Brand, Myrtle, Minneapolis.
Brandt, G. Herbert, Minneapolis.
Branham, Alice, Minneapolis.
Breen, Genevieve R., Minneapolis.
Broecker, Lydia M., Afton.
Brogmus, Walter H., Minneapolis.
Brown, Arthur V., Alexandria.
Brown, Doris L., Alexandria.
Brown, Dorothy W., Alexandria.
Brown, Mabelle, Sauk Center.
Brownson, Ralph, St. Paul.
Bruchholz, Henry V. A., Minneapolis.
Bruder, Victor W., Minneapolis.
Brunelle, Henry D., Cloquet.
Buckley, Irene H., Minneapolis.
Burgett, Georgia L., Faribault.
Burkhard, Arthur C., Preston.
Burns, Bessie, Graceville.
Byrnes, Lyle, Minneapolis.
Cabot, Verne S., Hector.
Cadwell, Nellie M., Stewartville.
Carey, Elisabeth, Minneapolis.
Carinan, Paul I., Minneapolis.
Carr, Marguerite H., Minneapolis.
Carvill, Ernest H., Minneapolis.
Casey, Elizabeth, St. Paul.

Casey, Joseph T., Franklin.
Casey, Nellie, St. Paul.
Chapin, George, St. Paul.
Cheatham, Susie E., Minneapolis.
Chilton, Alice, Howard Lake.
Chilton, Edward, Frazee.
Clark, Jennie, St. Paul.
Clark, Margaret B., Minneapolis.
Clark, Mary R., Minneapolis.
Cliff, F. Neill, Ortonville.
Collins, Elsie M., Crookston.
Corbett, Louise, St. Paul.
Corcoran, Ben, Minneapolis.
Corniea, Albert P., Plato.
Corniea, Francis, Plato.
Cotnam, Louise, St. Paul.
Cox, F. Hanford, Cloquet.
Cox, Marie, Minneapolis.
Crampton, Lora, Minneapolis.
Crawford, Fred G., Faribault.
Curley, Roy F., Stillwater.
Currier, Helen L., Minneapolis.
Curtis, Carolyn, Minneapolis.
Dahl, Sigvert S., Virginia.
Dane, Harold J., St. Paul.
Davies, Pearl J., Afton.
Davis, Margaret G., Minneapolis.
Dawson, Lillian, Minneapolis.
Dayton, Josephine, Minneapolis.
Decker, Lynn W., Minneapolis.
De la Barre, Louise, Minneapolis.
Dickinson, Rhoda, Buffalo.
Didier, Marcelle C., Minneapolis.
Dockstader, Mildred, Highwood.
Doherty, Vivienne R., Minneapolis.
Donery, Gertrude E., Minneapolis.
Donohue, John N., St. Paul.
Doremus, Fern, Duluth.
Douglass, Ralph E., Minneapolis.
Dowswell, Walter J., Minneapolis.
Drake, Edward R., St. Paul.
Drake, Leah R., Detroit.
Dunn, Ney, Minneapolis.
Du Toit, Dana W., Chaska.
Eder, Walter H., Blue Earth.
Edmonds, Clarence P., Groton, S. D.
Edsall, Mary Louise, Minneapolis.
Ehri, Eda, Minneapolis.
Eisler, Charles J., Minneapolis.
Elliott, William T., Minneapolis.
Ellis, Theodora, Minneapolis.
Engberg, Edward John, Cambridge.
Erd, Marie, Minneapolis.
Erickson, Beda, Minneapolis.
Erickson, Edwin O.,
Cooperstown, N. D.
Erickson, Ruth, Minneapolis.
Ewing, Louise, St. Paul.
Fagre, J. Barthell, Flandreau, S. D.
Farmer, Fayette, Minneapolis.
Farrell, Jeannette, Minneapolis.
Ferguson, Ida M., Minneapolis.
Fischer, William H., Wabasha.
Fish, Edwin A., Minneapolis.

- Flssel, Walter, Le Mars, Ia.
 Flahavan, Frances, Minneapolis.
 Fleming, James J., St. Paul.
 Fletcher, Margaret N., Minneapolis.
 Fligelman, Frieda, Helena, Mont.
 Foley, Florence, Stillwater.
 Ford, Beth E., Mazeppa.
 Foss, Florence A., Milaca.
 Foss, Lillian E., Milaca.
 Foster, Bernice, Duluth.
 Foster, Evelyn, Minneapolis.
 Foster, Mary, Duluth.
 Frey, Henry, St. Paul.
 Fuller, Ruth, Minneapolis.
 Gee, Marian, Minneapolis.
 Gibson, Mildred C., St. Paul.
 Gillette, Raymond M., Minneapolis.
 Gleason, Clara, Minneapolis.
 Goodman, A. Laird, Duluth.
 Gorham, Ira B., Minneapolis.
 Graff, Fred W., Cooperstown, N. D.
 Grand-Maitre, Blanche, Floodwood.
 Griffin, John F., Shakopee.
 Grondahl, Mabel, Red Wing.
 Gutteresen, Alvin W., Lake Crystal.
 Haggard, Charles H., Worthington.
 Hammond, May A., Minneapolis.
 Hank, Eva, Minneapolis.
 Hanke, Ethel F., Minneapolis.
 Hanks, Mabelle L., Minneapolis.
 Hansen, Anna M. K., Minneapolis.
 Hansen, Pearl C., Duluth.
 Harris, Charles L., Minneapolis.
 Hart, Verna M., Minneapolis.
 Hartgering, Genevieve,
 Rapid City, S. D.
 Hartney, Agnes Jean, Maynard.
 Heffner, Bernhardina, Minneapolis.
 Hellig, Charles A., Milaca.
 Henderson, Elizabeth, Minneapolis.
 Hensel, Kenneth N., St. Paul.
 Hermann, Ruth E., Minneapolis.
 Hibbard, Hazel L., Minneapolis.
 Higley, Merle, Minneapolis.
 Hillman, Merton S., Minneapolis.
 Hitchcock, Blanche S., Minneapolis.
 Hodgson, Drusilla M., Elbow Lake.
 Hokanson, John A., Hector.
 Holmer, Adolph F., Virginia.
 Holmes, Donald S., Duluth.
 Houck, Margaret, Minneapolis.
 Houghtaling, Elma, Fairmont.
 Howard, H. Lynne, Champlin.
 Hull, Anne, Minneapolis.
 Hunt, Frances, St. Paul.
 Jackson, Teckla, Eveleth.
 Jacobson, Albert, Jewell, Ia.
 Jenkins, Louise, Minneapolis.
 Jensen, Dora, Minneapolis.
 Johnson, Allina, Minneapolis.
 Johnson, Irene B., Minneapolis.
 Johnson, Lydia Mathilda, Minneapolis.
 Johnson, Margaret M., Minneapolis.
 Jones, Edith L., Minneapolis.
 Jones, Elinor, Wabasha.
 Jones, Gladys, Cedar Falls, Ia.
 Jones, H. Malcolm, Minneapolis.
 Jones, Margery N., Minneapolis.
 Joyce, Helen, Minneapolis.
 Jude, Margaret, Libby.
 Julien, Margaret, St. Paul.
 Kaiser, Walter, Stillwater.
 Karatz, Lucian, Minneapolis.
 Keefe, Percy, Minneapolis.
 Kelley, Alta, Crystal Bay.
 Kellogg, Helen, St. Paul.
 Kells, Lyman, Sauk Center.
 Kenety, William F., Fulda.
 Kennedy, Agnes, St. Paul.
 Kennedy, Roger, St. Paul.
 King, William A., Grand Rapids.
 Kipp, Ivan J., St. Paul.
 Kirkevold, Hans P., Hendricks.
 Klein, Kenneth O., Minneapolis.
 Klimenhagen, Ray R., St. Paul.
 Klossner, Lulu, Winthrop.
 Knappen, Marjorie, Minneapolis.
 Knight, Mary, Minneapolis.
 Knoblauch, Frank B., Minneapolis.
 Kramer, Anna, Minneapolis.
 Kueffner, Wm. R., St. Paul.
 Lamoth, Arthur, Minneapolis.
 Lane, L. Emmett, Minneapolis.
 Lange, John W., Elysian.
 Lange, Lorna, St. Paul.
 Larsen, Elmer W., Hopkins.
 Latimer, S. Roy, Gladstone, Mich.
 Laughlin, Elmer B., Tracy.
 La Vayea, George, Minneapolis.
 Lee, Agnes A., Akeley.
 Lee, Ruth, Stillwater.
 Leete, Helen P., Sparta, Wis.
 Lemon, Kenneth, St. Paul.
 Lenning, A. Viola, Duluth.
 Lester, Flora R., Breckenridge.
 Lindem, Zelma M., Herman.
 Lindgren, Agnes A., Minneapolis.
 Linton, Hildur T., Minneapolis.
 Longstaff, R. S., Huron, S. D.
 Love, Genevieve, Wayzata.
 Lowell, Frances E., Minneapolis.
 Lutzl, Pearl A., Minneapolis.
 Lyle, Marie C., Minneapolis.
 McCall, Margaret, Minneapolis.
 MacCallum, Marion S., Minneapolis.
 McConkey, Clyde J., Brewster.
 McConnell, Vera G., Minneapolis.
 McCray, Alice R., St. Paul.
 McDavitt, Sarah, St. Paul.
 McDermott, Helen C.,
 Rhineland, Wis.
 McDavitt, Florence A., Minneapolis.
 McGrath, Margaret, Minneapolis.
 McGrath, Vera, Minneapolis.
 McGregor, Della, St. Paul.
 McKeen, Edwin, Minneapolis.
 McKenzie, John Wallace, Groton, S. D.
 McNally, William J., Minneapolis.
 McNamee, Ruth, Helena, Mont.
 Magnuson, Ida, Red Wing.
 Mallory, Arthur, St. Paul.
 Mann, Walter L., Lake Benton.
 Mannheimer, George, St. Paul.
 Mansfield, Esther, Minneapolis.
 Mansfield, Lavinia, Minneapolis.
 Mapes, Alta I., Minneapolis.
 Marshall, Lila M., Minneapolis.
 Marshall, Minnie E., Minneapolis.

- Martens, Irma, Minneapolis.
 Marvin, Mary M., Zumbrota.
 Mason, Harold C., Minneapolis.
 Matson, Ethel R., Minneapolis.
 Melbourn, Della, Minneapolis.
 Menefee, Guy C., Albert Lea.
 Merriman, Mildred, Minneapolis.
 Michie, Roy G., Montevideo.
 Mielke, Edwin J., Glencoe.
 Miles, Alice M., St. Paul.
 Millar, Marguerite I., Minneapolis.
 Miller, Faith E., St. Paul.
 Mitchell, Ethel M., Minneapolis.
 Moir, Agnes P., Minneapolis.
 Monaghan, John, Duluth.
 Moulton, Nettie, Dawson.
 Murnane, Winnifred, St. Paul.
 Murphy, Paul, Minneapolis.
 Murphy, William T., Minneapolis.
 Nash, Malcolm A., Tracy.
 Nelson, Nan, St. Paul.
 Neumeier, Karl G., Stillwater.
 Nordberg, John, Minneapolis.
 Norman, Sigvald, Ortonville.
 Nygren, Selma, Lake City.
 O'Connor, Irene, Renville.
 O'Hare, Edward S., Minneapolis.
 O'Leary, Abigail, Wabasha.
 Oliver, Pearl, Minneapolis.
 Olsen, Myrtle F., Minneapolis.
 Osborn, Byrle J., Excelsior.
 Ostergren, Ralph C., Gladstone.
 Ostlund, Haddon A., Minneapolis.
 Otterstein, Earl, Amboy.
 Overlock, Ellen, Minneapolis.
 Palmer, Ben, St. Paul.
 Parker, James K., Minneapolis.
 Parks, Carl H., Montevideo.
 Parmele, Margaret H., St. Paul.
 Parsons, B. France, Minneapolis.
 Paschal, Franklyn C., Davenport, Ia.
 Patterson, Helen, Minneapolis.
 Payette, Charles T., Minneapolis.
 Pearce, Amy E., Hibbing.
 Pearce, Will, Duluth.
 Peik, Wesley E., Jordan.
 Pershon, Erich, Young America.
 Petersen, Berenice, Minneapolis.
 Petersen, Laura Muller, Minneapolis.
 Peterson, Andrew M., St. Paul.
 Peterson, Harry H., St. Paul.
 Peterson, Julian M., Bemidji.
 Petterson, Gustav S., Battle Lake.
 Phillips, Mellie R., Minneapolis.
 Piemeisl, Rudolph, Jordan.
 Pond, Katherine L., Minneapolis.
 Pope, Anna E., Minneapolis.
 Pratt, Maud M., Pipestone.
 Prest, Helen, St. Paul.
 Prevay, Paul, Beardsley.
 Ramsland, Odin, Sacred Heart.
 Rankin, Charlotte, Minneapolis.
 Rathbun, Russell B., Minneapolis.
 Reasoner, Shirley W., New Brighton.
 Reed, Mary L., Duluth.
 Rees, Lester, Minneapolis.
 Reese, Frank, Minneapolis.
 Reque, Anna Diderikke, Minneapolis.
 Richmond, Hazle F., Clark, S. D.
 Rickert, Paul M., Minneapolis.
 Riebeth, Chester E. E., Minneapolis.
 Rippe, Lorena E., Fairmont.
 Roberts, Caroline D., Minneapolis.
 Roberts, Edward B., Minneapolis.
 Robinson, Grace E., Minneapolis.
 Robinson, Rhea B., Minneapolis.
 Roenisch, Clinton W., Minneapolis.
 Rogerson, Eleanor H., Minneapolis.
 Ronan, Neil T., Lewiston.
 Root, Dorothy A., Minneapolis.
 Rosenwald, Reuben M., Plato.
 Rosholt, Norma, Minneapolis.
 Rosing, Marguerite, St. Paul.
 Ruble, Edna, Albert Lea.
 Rude, Emil, Pelican Rapids.
 Ryan, Clara, Freeport, Ill.
 Sage, Edith, Minneapolis.
 Sanborn, Helen A., Minneapolis.
 Sanford, Bertha B., Minneapolis.
 Sather, Harold C., Barron.
 Sawyer, Sara E., Minneapolis.
 Saxton, Florence, Minneapolis.
 Schabacker, Carrie, Menomonie, Wis.
 Schmidt, Nelson A., Le Mars, Ia.
 Schrader, Hilde, St. Paul.
 Schulstad, Einar T., St. Paul.
 Schulz, Alma, Brainerd.
 Seaton, Edward A., Muncie, Ind.
 Selover, William P., Lake City.
 Sende, Jonas A., Monticello.
 Shearer, Hermione, Minneapolis.
 Shedd, J. Lottia, Pasadena, Cal.
 Shepardson, Charlotte, Minneapolis.
 Shepley, Clara, Minneapolis.
 Sherwin, Eva, Monticello.
 Sherwood, Rachael M., Minneapolis.
 Shipley, Albert L., Virginia.
 Sias, De Forrest J., Madison.
 Simmons, Frank H., Minneapolis.
 Simmons, Ralph A., St. Paul.
 Simons, Leighton R., Virginia.
 Sinclair, Nora F., Fairmont.
 Skinner, Miriam, Minneapolis.
 Sleeper, Agnes J., Minneapolis.
 Smart, Ruth A., St. Paul.
 Smith, Alice L., Minneapolis.
 Smith, Arthur P., Minneapolis.
 Smith, Elizabeth M., Minneapolis.
 Smith, F. Paul, Groton, S. D.
 Smith, Ralph G., Groton, S. D.
 Smith, Vera C., Minneapolis.
 Snell, Ella M., St. Paul.
 Souther, M. Edwin, Coleman, S. D.
 Spates, Marjorie, St. Paul.
 Spencer, Ethel, Minneapolis.
 Springer, George T., Gladstone, Mich.
 Stadsvold, Sidney, Austin.
 Starrett, Raymond L., Minneapolis.
 Stearn, Harriett M., Minneapolis.
 Steinmetz, Jennie C., Minneapolis.
 Stellwagen, Grace, Minneapolis.
 Stevens, Dorothy C., Minneapolis.
 Stiles, Glenn S., Minneapolis.
 Stone, Philip M., Morris.
 Storer, Mary F., Minneapolis.
 Strate, Johanna, Duluth.
 Sturtevant, F. Hardy, Detroit.
 Suffel, Wm. Reynolds, Duluth.

McFarland, William D., Minneapolis.
 McIntyre, Lois L., Minneapolis.
 Manning, Ray L., Minneapolis.
 Mather, William S., Groton, S. D.
 Melvin, Milton W., Minneapolis.
 Mielke, Wilhelmina, Lonsdale.
 Mills, Helen, Mankato.
 Milton, Evalyn, St. Paul.
 Mitchell, Hattie E., Minneapolis.
 Moore, Nettie B., Minneapolis.
 Morris, Marie, Minneapolis.
 Morrissey, Mabel, St. Paul.
 Mowry, J. L., Minneapolis.
 Nehls, Marie S., Minneapolis.
 Neumann, Ella, St. Paul.
 Nichols, Florence E., Minneapolis.
 Nichols, Ruth, St. Paul.
 Nicholson, Mrs. E. E., Minneapolis.
 Oredalen, Mary, Kenyon.
 Owen, Dana Cavour, Osseo.
 Papez, James W., Hector.
 Pepper, Dorothy S., Minneapolis.
 Phillips, Grace, Minneapolis.
 Phillips, Milo A., Minneapolis.
 Plant, Helen, Minneapolis.
 Prigge, Lambert F., Ada.
 Randall, Robert C., Mankato.
 Rees, Inez, Minneapolis.
 Richards, Chloe E., Duluth.
 Rodeen, Charles, Minneapolis.
 Ronning, A. G., Boyd.
 Russell, Loretta, Mankato.
 Schladinski, Frank E., Winona.
 Schmidt, Hans W., St. Paul.
 Schmidt, Mathilda, Minneapolis.
 Schroeder, Herman W., Minneapolis.

Schruth, J. L., Duluth.
 Schuknecht, John R., Minneapolis.
 Shaleen, Anna, St. Paul.
 Smith, Emmett W., Minneapolis.
 Sommermeyer, Louise W., Minneapolis.
 Spies, A. Agnes, Graettinger, Ia.
 Stellwagen, Mrs. S. A., Minneapolis.
 Stephens, Stella M., Minneapolis.
 Stokes, Ralph S., St. Paul.
 Storms, R. L., Minneapolis.
 Stratte, Arthur, Dawson.
 Swanson, Elaine, St. Paul.
 Tallant, Webster, Minneapolis.
 Tatham, Ayrton, St. Paul.
 Thompson, Ida B., Grandy.
 Tillotson, Benjamin F., Moorhead.
 Tincher, Coyle C., Minneapolis.
 Trimble, Alice B., Minneapolis.
 Von Scholten, Toska M., Minneapolis.
 Wadden, Agnes R., Madison, S. D.
 Walker, Frank G., Minneapolis.
 Ware, Jennie, St. Paul.
 Webster, Florence P., Minneapolis.
 Wilk, Harry, Minneapolis.
 Williams, Lorenzo, Minneapolis.
 Williams, Lotta, Spring Park.
 Williams, Olive, Minneapolis.
 Winton, Maynard, Minneapolis.
 Witchie, Lella A., Minneapolis.
 Wolff, De Graff, St. Paul.
 Wright, Mary, Minneapolis.
 Young, Frances L., St. Paul.
 Zelladt, Ernest A., Minneapolis.
 Zellar, Enza A., St. Paul.

Six Years Medical Course

SOPHOMORES—33

Bailey, Herbert B., Jackson.
 Berrisford, Paul D., St. Paul.
 Bratrud, Arthur F., Warren.
 Carroll, William C., St. Paul.
 Dorge, Richard I., Minneapolis.
 Douglass, Jesse E., Blue Earth.
 Eisengraeber, Gustav, St. Paul.
 Frisch, Frank, Grogan.
 Gardner, Edwin L., Minneapolis.
 Grant, Malcolm, Faribault.
 Griffin, Patrick J., Shakopee.
 Hand, Robert D., Elbow Lake.
 Handy, John A., Good Thunder.
 Haugen, Leslie, Albert Lea.
 Kirsch, Ralph L., Crookston.
 Klein, Harry, Duluth.
 Lepper, Lawrence E., Minneapolis.

Michelson, Henry E., Bismarck, N. D.
 Morris, Mary, Minneapolis.
 Nordley, Harry, Minneapolis.
 Oppel, Arthur F., Fulda.
 Paulson, Carl W., Minneapolis.
 Peppard, Thomas A., Minneapolis.
 Pollock, Lee W., Rochester.
 Satterlund, Victor L., Minneapolis.
 Seifert, Otto J., New Ulm.
 Snell, Charles F., Detroit.
 Snyder, George W., St. Paul.
 Undine, Clyde A., Minneapolis.
 Weed, Frank E., Conway, N. D.
 Wetherby, Victor L., Minneapolis.
 Whittier, Raymond W., Minneapolis.
 Workman, Warner G., Tracy.

FRESHMEN—55

Aldes, Harry, St. Paul.
 Badeaux, George I., Brainerd.
 Blake, Henry S., Minneapolis.
 Bonness, Hazel, Minneapolis.
 Bratrud, Edward, Spring Valley.
 Brodie, Walter D., St. Paul.
 Campbell, Lowell M., Minneapolis.

Carman, Paul I., St. Paul.
 Clune, J. Leo, Minneapolis.
 Cooley, John Ford, Madelia.
 Davis, Thayer C., Akeley.
 Finley, William F., Ferryville, Wis.
 Gordon, Frank A., Williston, N. D.
 Hall, Joseph M., Minneapolis.

Hening, Robert M., Minneapolis.
 Hilger, Leo A., St. Paul.
 Howe, Archibald W., St. Paul.
 Jenson, Oscar, Minneapolis.
 Josewitsch, Alexander, Minneapolis.
 Karras, Ray W., Hudson, Wis.
 Kleinmann, Francis, Hutchinson.
 Kucera, William J., Hutchinson.
 Langworthy, Effie W., Minneapolis.
 Langworthy, Willis H., Minneapolis.
 Larson, Wilmer, St. Paul.
 McCrady, Willis G., Owatonna.
 McGuire, Lee, St. Paul.
 McIntosh, Henry C., St. Paul.
 McMillan, Ralph, Minneapolis.
 Mariette, Ernest S., Minneapolis.
 Mintz, Harry A., St. Paul.
 Moersch, Fred P., St. Paul.
 Morell, Clifford F., Verndale.
 Nesse, Silas A., Mabel.
 Nordland, Martin, Minneapolis.

Nuessle, Walter G., Springfield.
 Nugent, Earl, Glenwood.
 Quinnell, Earle D., Neche, N. D.
 Robilliard, Charles M., Faribault.
 Roddis, Louis H., Osakis.
 Rydell, Charles B., North Branch.
 Senescall, Cleve R., Ortonville.
 Sjolvas, Amly S., Hoffman.
 Smiley, Mervale, Minneapolis.
 Smith, Orrin Kenneth, Minneapolis.
 Steffen, Theodor H., New Ulm.
 Stratte, Joseph J., Dawson.
 Sunwall, J. Oscar, Minneapolis.
 Tisdale, Mahlon, Slayton.
 Ulsaker, Oscar M., Wahpeton, N. D.
 Warwick, Margaret M., Goodhue.
 Webb, Roscoe C., Tracy.
 Weibeler, Peter H., Minneapolis.
 Wohlrabe, Arthur A., Truman.
 Woltmann, Henry W., Minneapolis.

The College of Engineering and the Mechanic Arts

SENIOR CLASS

CIVIL ENGINEERS—26

Ash, J. Wesley, Wendell.
 Borrowman, Le Roy, Stillwater.
 Brenchley, Harry E., Minneapolis.
 Comstock, John Walter, Minneapolis.
 Dallimore, Arthur N., St. Paul.
 Doeltz, William F., Minneapolis.
 Dougan, Henry K., Minneapolis.
 Fiske, F. William, St. Paul.
 Fleming, Douglas R., St. Paul.
 Furber, Pierce P., Northfield.
 Gage, Hugh Newton, Winona.
 Houston, Cecil C., Minneapolis.
 Hustad, Andrew P., Minneapolis.

Knowlton, Herbert H., Minneapolis.
 Krauch, William L., St. Paul.
 Lang, Fred, Spokane, Wash.
 Longfellow, Dwight W., Minneapolis.
 McCall, Harry J., Minneapolis.
 McCree, A. A., St. Paul.
 Mowery, Clarence W., Northfield.
 Quinn, John, Minneapolis.
 Robertson, Charles N., Sleepy Eye.
 Schlattman, Edward Charles, Alberta.
 Walker, George William, Minneapolis.
 Widell, G. Fred, Mankato.
 Willis, Roy, St. Paul.

ELECTRICAL ENGINEERS—28

Anderson, Frank Arthur, Wells.
 Bachrach, Alfred, Faribault.
 Brown, George J., Minneapolis.
 Carter, Robert J. S., Minneapolis.
 Casberg, James W., Minneapolis.
 Currie, Neil Jr., Minneapolis.
 Dikkers, Henry, St. Paul.
 Frahm, Alfred R., Rochester.
 Hoppin, Glenn H., Minneapolis.
 Hovelson, Henry, Minneapolis.
 Japs, Barney G., Hopkins.
 Kauffman, Roy, Minneapolis.
 King, Alfred B., Welcome.
 McAfee, Allan L., St. Paul.

Miller, Addison, St. Paul.
 Pancratz, Frank J., Perham.
 Peterson, Clarence A., Minneapolis.
 Prentice, Robert S., Minneapolis.
 Schildt, William F. H., Hastings.
 Schoepf, Alfred Walter, Appleton.
 Scoble, Frank G., Duluth.
 Sperry, Leonard B., Milaca.
 Sturtevant, Percy G., Detroit.
 Svendsen, George P., Minneapolis.
 Swanstrom, Frank, Lake Park.
 Sweningsen, Oliver, Austin.
 Weibeler, William M., Belle Plaine.
 Zimmerman, Louis P., Waseca.

MECHANICAL ENGINEERS—16

Anderson, Ole A., Hawley.
 Bingham, Stanley E., New Ulm.
 Councilman, Halsted P., Minneapolis.
 Cox, Richard F., Graceville.
 Estep, Harvey Cole, Minneapolis.
 Fleming, Frank R., St. Paul.
 Frary, Hobart D., Minneapolis.
 Harwood, Stanley G., Minneapolis.

Hetherton, Percival, Minot, N. D.
 Morris, Thomas C., Minneapolis.
 Norellus, Emil F., Luverne.
 Norton, Clyde W., Minneapolis.
 Peterson, George T., New Ulm, R 3.
 Priedeman, George W., St. Paul.
 Walsh, James, Northfield.
 Weber, Erwin, Minneapolis.

MUNICIPAL ENGINEERS—5

Bergoust, Oscar J., Minneapolis.
 Norelius, Lewis M., Luverne.
 Okes, Day I., Minneapolis.

Olsen Melvin S., Spring Valley, Wis.
 Wodrich, Oscar F., Minneapolis.

SCIENCE AND TECHNOLOGY—4

Clarke, Charles P., Elysian.
 Fruen, Arthur B., Minneapolis.

King, Robert N., Minneapolis.
 McKeehan, Louis Williams, Minneapolis

JUNIOR CLASS

CIVIL ENGINEERS—20

Childs, James A., St. Paul.
 Ellison, Jay T., St Paul.
 Elsberg, William, Minneapolis.
 Esser, Frank F., Elsworth.
 Frahm, Herbert C., Rochester.
 Geraghty, Hubert A., St. Paul.
 Godward, Alfred C., Elbow Lake.
 Hubbard, Frederick A., Minneapolis.
 Hubbard, Henry A., Spencer.
 Ingberg, Simon H., Hendrum.

Jaques, Robert, Duluth.
 King, Lawrence W., Minneapolis.
 Moyer, Malcolm B., Minneapolis.
 Nelson, Edward Severy, St. Paul.
 Olsen, Arthur O., Muskegon, Mich.
 Paul, Fred T., Minneapolis.
 Sheffield, Fred W., Crookston.
 Shepard, George M., Kenyon.
 Siverts, Samuel A., Morris.
 Torrance, Ell Jr., Minneapolis.

ELECTRICAL ENGINEERS—31

Beckjord, Walter C., St. Paul.
 Brockway, Alvah E., Luverne.
 Chandler, Malcolm D., Minneapolis.
 Cobban, Rollo J., Luverne.
 Davies, Ralph M., Minneapolis.
 Converse, Clovis M., St. Paul.
 Fitts, Joel A., Minneapolis.
 Harris, Clayton, Park River, N. D.
 Gadsby, Lester H., Minneapolis.
 Grant, Fred R., Windom.
 Harris, Clayton, Minneapolis.
 Hitzker, Albert J., Winona.
 Hopkins, Mark L., Minneapolis.
 Hornibrook, James Wm., Tower.
 Johnson, Herman R., Minneapolis.
 Kaplan, Eugene, Owatonna.

Kreger, A. J., Le Sueur.
 Kruschke, George A., Duluth.
 Larson, Phinney O., Fosston.
 Lindefel, Charles G., Rush City.
 McKenzie, Lauren F., Glencoe.
 Murrish, Frederic E., Minneapolis.
 Piper, Herman, Stillwater.
 Poore, Orson B., Bird Island.
 Powles, James W., St. Paul.
 Stillman, Marcus H., Austin.
 Stillman, Paul R., Riceville, Ia.
 Turner, Leslie E., St. Paul.
 Vita, Theodore, New Prague.
 Walling, Benjamin B., Winona.
 Williams, Fred M., Elk River, Minn.

MECHANICAL ENGINEERS—22

Beery, Charles B., Minneapolis.
 Bieri, John B., Wells.
 Birnberg, Zingel, St. Paul.
 Buck, Frederick W., W Duluth.
 Buhl, John E., Graceville.
 Forfar, Donald M., Minneapolis.
 Holmgren, Charles E., Breckenridge.
 Johnson, Frank, Willmar.
 Kircher, Frank J., Hudson, Wis.
 Kircher, George A., Hudson, Wis.
 Knopp, Willam R., St. Paul.

Lambert, Edwin M., Young America.
 Mark, Walter J., St. Paul.
 Morris, John E., Minneapolis.
 Moyer, Malcolm B., Montevideo.
 Nemec, Frank Louis, Montgomery.
 Shippam, Willis, Minneapolis.
 Starrett, Howard M., Minneapolis.
 Thompson, Herbert Leslie, Minneapolis.
 Udell, Carl D., Wells.
 Williams, Wilbur S., Buffalo, N. Y.
 Wright, Harris H., Farmington.

MUNICIPAL ENGINEERS—3

Ittner, William F., Red Lake Falls.
 Okes, Sidney R., Minneapolis.

Moe, Alfred H., Duluth.

SCIENCE AND TECHNOLOGY—2

Boyum, Benj. O., Rushford.

Curtiss, Lindsley B.

SOPHOMORE CLASS

CIVIL ENGINEERS—36

Asleson, Hans.
 Brownell, Otto E.
 Adams, Ben. W., Pine Island.
 Bolme, Ole M., Sperry, N. D.
 Chapman, Berton L., Westbrook.
 Crockard, Geo. E., Britton, S. D.
 Dahlquist, Philip L., Minneapolis.
 Davison, Dodo E., Granada.
 Effertz, Edward P., Norwood.
 Ekman, Claes T., St. Paul.
 Ferguson, Walker, Mankato.
 Fields, Howard H., St. Paul.
 Fossen, George, Fergus Falls.
 Fox, Milo P., Mankato.
 Fredin, Conrad G., Duluth.
 Hauser, Rupert V., St. Paul.
 Jevne, George W., Minneapolis.
 Jensen, Arthur H., Kasson.

Johnson, Paul A., Minneapolis.
 McGinnis, William H., Staples.
 Mark, Reuben A., St. Paul.
 Merriell Walter H., Minneapolis.
 Merrill, Lewis H., Minneapolis.
 Methven, Clyde, Minneapolis.
 Meyer, C. Foerster, Minneapolis.
 Motl, Charles L., Alpha.
 Nason, George L., St. Paul.
 Orbeck, Martin J., Eau Claire.
 Overholt, Harley G., Minneapolis.
 Sawyer, Emerson D., Minneapolis.
 Sommerfeld, Adolph A., Sleepy Eye.
 Swedberg, M. Roy, Luverne.
 Timperly, William D., Minneapolis.
 Wardell, John M. Jr., Tracy.
 Weld, Quade C., Minneapolis.
 Wolff, Henry Ernest, St. Paul.

ELECTRICAL ENGINEERS—48

Anderson, Oscar V., Hudson, Wis.
 Arvold, Henry M., Strong's Prairie.
 Ashworth, Roy H., Mankato.
 Beck, Vernon S., Minneapolis.
 Carpenter, Ernest F., Redwood Falls.
 Chapin, Sprague L., Luverne.
 Clarkson, Cyrus E., St. Charles.
 Conley, Wilfred E., Lake Mills.
 Cook, H. C., Red Wing.
 Cooper, Ray Lee, Britton, S. D.
 Cottingham, George, Minneapolis.
 Councilman, Walter L., Minneapolis.
 Dahlstrom, Raymond E., St. Paul.
 Drinkall, Leon R., Spring Valley.
 Duffy, Raymond V., Minneapolis.
 Grinols, Earl L., Fair Haven.
 Hagstrom, Herbert E., Minneapolis.
 Hansen, Christian, St. Paul.
 Healy, Ralph L., Red Lake Falls.
 Hicks, Emery A., Byron.
 Hush, Howard R., Minneapolis.
 Jespersion, Clarence M., Minnetonka.
 Johnson, Leonard I., Minneapolis.
 Jones, Watkin W., Windom.

Josephson, Elliot B., Red Wing.
 Krauser, Aloysius, Minneapolis.
 Landeen, Arvid G., Garfield.
 Larson, Edwin G., Fosston.
 Layman, Jesse O., Minneapolis.
 Lyford, Dartt H., Minneapolis.
 McClure, Howard W., Litchfield.
 McQuillin, Raymond E., Britton, S. D.
 Muir, John S., Hampton, Ia.
 Nelson, C. Hugo, Minneapolis.
 Nelson, Fred C., Chatfield.
 Olson, Clarence, Two Harbors.
 Packer, Alfred H., St. Paul.
 Phelps, Ray R., St. Paul.
 Purcell, Richard T., Minneapolis.
 Rasmussen, Carl R., Faribault.
 Reid, Harry A., Mankato.
 Reiff, Ernest R., No. St. Paul.
 Richley, Clyde A., Minneapolis.
 Shepard, Donald D., Waseca.
 Soulek, Joseph H., Montgomery.
 Stahlmann, Henry C. G., St. Paul.
 Stover, Lester A., Minneapolis.
 Swenson, Theodore M., St. Paul.

MECHANICAL ENGINEERS—27

Albrecht, Armin G., St. Paul.
 Best, H. L., Minneapolis.
 Brohaugh, George O., Shelby.
 Bush, John C., Duluth.
 Comb, Fred R., Minneapolis.
 Cone, Robert A., Minneapolis.
 Du Toit, George A., Chaska.
 Fleming, Lawrence T., Minneapolis.
 Frear, Jenness B., Excelsior.
 Gjerberg, Ole H., Red Lake Falls.
 Holden, E. G., Minneapolis.
 Larson, Martin S., Red Wing.
 Lutz, Robert A., Mantorville.
 Markoe, James C., St. Paul.

Martin, Wallace H., Willmar.
 Mencke, Paul A., St. Paul.
 Meixner, Bernard A., Owatonna.
 Moyer, Amos F., Montevideo.
 Nichols, Browning, Montevideo.
 Olstad, Oscar A., Minneapolis.
 Oram, Robert C., Willmar.
 Palmer, Porteus B., St. Paul.
 Pease, Maynard W., Minneapolis.
 Salisbury, Willis R., Minneapolis.
 Stone, Webster H., Alden.
 Tolstad, Martin, Starbuck.
 Westbrook, Donald M., Minneapolis.

MUNICIPAL ENGINEERS—2

Bazil, Joseph G., Montgomery.

Smith, George H., Spring Valley.

SCIENCE AND TECHNOLOGY—2

Barney, Hadwen C., Minneapolis.

Buffington, J. Raymond, Minneapolis.

FRESHMAN CLASS

CIVIL ENGINEERS—67

Adams, John W., St. Paul.
 Ainslie, Arthur F., Rochester.
 Allen, Edgar M., Minneapolis.
 Alwin, Sydney S., New Ulm.
 Arnesen, Herbert P., Benson.
 Bailey, William H., Minneapolis.
 Bernstein, Jacob, Stillwater.
 Blanchard, Cecil D., St. Paul.
 Boerner, Frank C., Duluth.
 Bowen, Clarence W.,
 South Pasadena, Cal.
 Bradley, Gaylord, Paynesville.
 Buhl, Thomas J., Graceville.
 Claybourn, John G., Albert Lea.
 Cottingham, Will, Helena, Mont.
 Coughlan, Edward D., Mankato.
 Counter, John R., Minneapolis.
 Croft, Ernest B., Minneapolis.
 Curtis, Thmas H., Fairmont.
 Cutter, Leeds H., Anoka.
 Cutter, William W., Anoka.
 Darby, George A., Minneapolis.
 Elfstrum, Axel E., Willmar.
 Enger, Edward H., Minneapolis.
 Fieldman, David, Duluth.
 Flygare, August L., Winthrop.
 Gilman, Chenoweth H., St. Paul.
 Goodnow, Marion H., Minneapolis.
 Hartnett, John G., Graceville.
 Hauser, Kenneth, St. Paul.
 Haven, Frank G., Minneapolis.
 Higble, George, Grand Meadow.
 Hodnett, Ralph M., St. Paul.
 Hoffmann, Michael J., St. Paul.

Hosfield, Raleigh Wm., Faribault.
 Hullsiek, Karl L., St. Paul.
 Hunt, Harold, Minneapolis.
 Ireland, Max A., Minneapolis.
 Johnson, C. Arthur, Minneapolis.
 Johnson, Lynn R., Minneapolis.
 Kvitrud, Ingwald, Minneapolis.
 Latham, Robert L., Minneapolis.
 Lepper, Orlando E., Minneapolis.
 McLeoud, Jason A., Lake City.
 Maney, George, Minneapolis.
 Mattison, George C., Minneapolis.
 Miller, Harold A., Guthrie Centre, Ia
 Nordstrom, Maurice H., Willmar.
 Peterson, Barney, Alvarado.
 Pidgeon, Vernon C., Minneapolis.
 Pratt, Benjamin A., Minneapolis.
 Ranney, Alfred G., St. Paul.
 Ravlin, J. H., Minneapolis.
 Record, George H., Minneapolis.
 Rich, George S., Minneapolis.
 Roth, Lewis M., Livingston, Mont.
 Russell, Irving H., Minneapolis.
 Sawyer, Eldreth L., Minneapolis.
 Scott, J. Allyn, Duluth.
 Siverson, Sigvel J., Minneapolis.
 Smith, R. Thorne, Superior, Wis.
 Smith, Sydney H., Mitchell, S. D.
 Stanton, Randall, St. Paul.
 Tuttle, William B., Minneapolis.
 Umbehocker, Grover, Princeton.
 Walby, Arthur C., Minneapolis.
 Warren, W. Albert, Minneapolis.
 Wold, Benjamin, Barron, Wis.

ELECTRICAL ENGINEERS—70

Anderson, Arthur R., Willmar.
 Andert, Fred A., Morris.
 Barden, Chauncey H., Minneapolis.
 Beal, William W., Minneapolis.
 Bennett, Eugene F., Preston.
 Bill, Earl M., Minneapolis.
 Bisek, Peter P., New Prague.
 Blair, Giles E., Wadena.
 Blossom, George W., Minneapolis.
 Bradley, Leml F., Lake Benton.
 Brunkow, Herbert, Delano.
 Burrows, Robert, St. Paul.
 Butterworth, Allan C., Minneapolis.
 Camp, John W., Wayzata.
 Campbell, Robert E., Minneapolis.
 Carson, J. Philip, St. Paul.
 Chapman, C. S., Lanesboro.
 Demarest, Charles S., Minneapolis.
 Dorrance, Albert P., Minneapolis.

Dow, Clarence A., Minneapolis.
 Emerson, Lynn A., Elmore.
 Ferriss, Benjamin C., St. Paul.
 Flaherty, John J., St. Paul.
 Forsberg, Peter W., Minneapolis.
 Frederickson, Harry B., Minneapolis.
 Giles, Aubrey L., Albert Lea.
 Gunderson, Walter B., Minneapolis.
 Hansen, Maurice J., Hopkins.
 Hjelm, Fred W., Minneapolis.
 Howard, Willard, Rice Lake, Wis.
 Huevelmann, Herbert H., New Ulm.
 Hyser, George W., Minneapolis.
 James, Henry C., St. Paul.
 Johnson, Chas. Walter, Minneapolis.
 Johnson, J. Ewald, Minneapolis.
 Kemmer, Judson, Fergus Falls.
 Kenyon, Ray H., Minneapolis.
 Kerr, Harry A., Park Rapids.

Klopsteg, Paul E., Fairmont.
 Koch, William C., St. Paul.
 Lane, John P., Minneapolis.
 Lutzi, Roy P., Minneapolis.
 McCoy, Ira C., Rochester.
 MacMullan, J. Elmer, Minneapolis.
 Magraw, C. Elliott, St. Paul.
 Markuson, Oscar, Fertile.
 Mireault, Henry J. E., Sandstone.
 Mittag, Albert H., Elizabeth.
 Mooney, Stanton G., Minneapolis.
 Murphy, John A., Anoka.
 Nagle, Clarence, Preston.
 Nebel, Harry, Braham.
 O'Brien, Raymond, St. Paul.
 Orme, Thomas, St. Paul.

Pengilly, Joseph H., Shakopee.
 Purves, Leland E., Viola.
 Riegel, Louis F., Rochester.
 Ringstrom, Ivan G., Wheaton.
 Rogers, Bertram H., Minneapolis.
 Schroeder, Carl W., Minneapolis.
 Shipman, William D., St. Paul.
 Stinson, Will V., Minneapolis.
 Streich, Harry C., Winona.
 Swenson, Albert, Willmar.
 Van Alstein, Harold, Princeton.
 Vancura, Edward W., Lakefield.
 Walker, William A., Moorhead.
 Wilson, Glenn W., Dover.
 Woodcock, Fremont, Princeton.
 Young, Charles N., St. Paul.

MECHANICAL ENGINEERS—30

Abbott, Theodore S., St. Paul.
 Barnum, Marvin C., Minneapolis.
 Bishop, Ira L., Mapleton.
 Bronson, Harry S., St. Paul.
 Brown, Francis A., St. Paul.
 Brown, William P., Yankton, S. D.
 Campbell, Arthur, Park Rapids.
 Christensen, George, Robbinsdale.
 Cohen, Julius M., St. Paul.
 Crawford, Fred G., Faribault.
 Crosby, Frederic, St. Paul.
 Dickey, Vernon G., Princeton.
 Farnam, Julian P., Minneapolis.
 Hess, Arba L., Minneapolis.
 Hobbs, Fowler K., Minneapolis.

Hoffman, Ralph Mueller, Minneapolis.
 Kasper, Walter F., Owatonna.
 Owens, Leo E., Minneapolis.
 Rand, Lars, Minneapolis.
 Ray, Frank J., Minneapolis.
 Sears, Lester Merriam, Minneapolis.
 Smalley, Clarence E., Lakefield.
 Sneve, Jack Stickney, St. Paul.
 Sudor, Hugh William, St. Paul.
 Swenson, Adolph, Kasota.
 Tydeman, Frederick E., Montevideo.
 Watrous, Russell W., St. Paul.
 Willits, Guy L., Minneapolis.
 Woodman, Joseph C., Minneapolis.
 Worcester, Harold, Minneapolis.

SCIENCE AND TECHNOLOGY—6

Aldrich, Robert G., Osakis.
 Bookwalter, Joseph S., Minneapolis.
 Bryant, Stewart H., St. Paul.
 Lanphear, Howard, Minneapolis.

Robinson, Frank J., Sauk Centre.
 Thvedt, Christen Bernhard,
 Minneapolis.

UNCLASSIFIED ENGINEERS—28

Arndt, William P., Pine Island.
 Atkinson, William B., Barnesville.
 Duncanson, Archie V., Stewartville.
 Foss, Elmer T., Minneapolis.
 Freel, Albert E., Duluth.
 Gilbertson, J. L., Atwater.
 Hawley, Robert C., Lanesboro.
 Hicks, Emery A., Byron.
 Huseby, John S., Cloquet.
 Kelty, Harland E., Minneapolis.
 Kruse, T. A., Minneapolis.
 McGonagle, Sargent, Duluth.
 McMillan, Edward C., Minneapolis.
 Merz, Edward H., Monticello.

Miner, Robert, Minneapolis.
 Nestaval, Stephen J., Montgomery.
 Nicholson, Percival H., Moorhead.
 Pettijohn, Lyle, St. Paul.
 Schmid, Robert J., Minneapolis.
 Shane, William G., Gladstone.
 Skytte, E. E., St. Paul.
 Stinchfield, Fred R., Robbinsdale.
 Todd, Milo E., Minneapolis.
 Trogner, Walter J., Minneapolis.
 Ulm, Lynne C., Red Wing.
 Walker, Herbert E., Minneapolis.
 Warren, Alvah H., St. Paul.
 Williams, Donald T., Minneapolis.

SUMMARY

Total enrollment 473

The College of Agriculture

GRADUATE STUDENT—1.

Gaumnitz, Carl, St. Cloud.

SENIORS—7.

Ainslie, George G., Rochester.
Canavarro, Georges de Souza,
Honolulu, Hawaii.
Cooper, Thomas P., Minneapolis.

Erwin, May, St. Anthony Park.
Hobart, Inez M., Minneapolis.
White, Hall B., Winnebago.
White, William, Camden, N. J.

JUNIORS—11.

Bergstrom, Chester H., Minneapolis.
*Bohn, Carl F., St. Paul.
Carroll, Harry B., Jr., St. Paul.
Hartzell, Mary K., Minneapolis.
Miller, Ralph C., Minneapolis,
Sta. F., R. 1.

Orr, George R., Michigan City, Ind.
Paterson, Thomas G., Wayzata.
Peterson, Elvin L., Olivia.
Underwood, Clarence, Hutchinson.
Ware, John F., St. Anthony Park.
West, Ralph L., Minneapolis.

SOPHOMORES—24.

Benson, Arnold O., Glenwood.
Benzin, Basil, Russia.
Berry, J. Bert, St. Paul.
Cleator, Fred W., Minneapolis.
Crandall, Leroy V., Red Wing.
Crimmins, Ellen May, Minneapolis.
Gaumnitz, Florence, St. Cloud, R 1.
Gore, John E., San Dimas, Cal.
Hohle, Ola Arnold, Hector.
Jacobson, Norman, Port
Washington, Wis.
Knowlton, Edith Viola, Minneapolis.
Krauch, Herman, St. Paul.

Laate, Gurid, St. Anthony Park.
Lathrop, Elbe A., Hugo.
Lewis, Charles L., Jr., St. Paul.
Marsden, Edith Viola, Edgerton, Wis.
Merrill, Alfred S., Minneapolis.
Pond, Harold H., Minneapolis,
Sta. F., R. 1.
Robb, George F., St. Paul.
Schrepel, Minnie A., LeSueur, R. 1.
Svarstad, Anne, Bath, So. Dak.
Underwood, William, Hutchinson.
Waller, Conrad J., St. Paul.
Potter, Alden A., Minneapolis.

FRESHMEN—74.

Alwin, LeRoy V., New Ulm.
Army, Albert C., St. Paul Park.
Arrivee, David A., St. Paul.
Baker, George J., St. Paul.
Baker, Norman M., Davenport, Ia.
Bilsborrow, James D., Wolverton.
Blegen, Martha C., Minneapolis.
Brewster, Donald R., Minneapolis.
Bryan, William James,
Red Wing, R 2.
Bush, Clarence A., Minneapolis.
Christopherson, Edna H.,
Sioux Falls, S. D.
Coan, John R., Minneapolis.
Collin, William H., Northwood, Ia.
Donovan, Raymond L., Dundas.
Drew, Laurence, St. Paul.
Devorchek, Henry E., Glencoe.
Erickson, Richard L., Stillwater.
Evans, H. Vaughn, Tracy.
Falkenhagen, Jay F., Montevideo.
Forsman, John A., Duluth.
Fowler, Charles F., Minneapolis.
Gilbertson, Henry W., Jasper.
Gillis, James R., St. Anthony Park.
Glotfelter, Madge L., Minneapolis.
Hagerman, Wm. F., Morris.

Hamilton, Carl L., Minneapolis.
Hartzell, Dorothy, Minneapolis.
Hauge, Adolph G., Albert Lea.
Haw, John W., St. Anthony Park.
Hayford, Ruth, Minneapolis.
Hillman, Frank M., Minneapolis.
Hofmann, Julius V., Janesville.
Howard, Leola M., Rochester.
Johnson, Fred O., St. Anthony Park.
Keefe, Adeline M., Minneapolis.
Lane, Dwight J., Minnetonka, R 2.
Lemon, Lynn, St. Paul.
McElmeel, Stephen P., St. Paul.
Madden, Virginia A., St. Paul.
Matthews, Charles A., Ortonville.
Merrick, Kathleen, Minneapolis.
Merrill, Frederick B., Stillwater.
Miles, Lee O., West Concord.
Moore, Will A., Chatfield.
Morstad, Irene C. M.,
Sioux Falls, S. Dak.
Nash, Malcolm A., Tracy.
Noble, William E., Albert Lea.
Ohman, Enoch, Glenwood.
Older, Frank E., Luverne.
Parmabee, Alice B.,
Sioux Falls, S. Dak.

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|-------------------------------------|---|
| Peters, Alfred G., Lake City, R 1. | Tolaas, Arne C., St. Paul. |
| Peterson, Joy R., St. Paul. | Uptegrafft, Leroy, St. Anthony Park. |
| Peterson, Roy M., Olivia. | Vafiadakis, Antony, Smyrna, |
| Poe, Richard, Cannon Falls. | Asia Minor. |
| Prosser, Eugene C., Minneapolis. | Vancura, Edward W., Lakefield. |
| Robbins, Leon H., Clearwater. | Weber, Henry G., Minneapolis. |
| Rowe, Bess M., Minneapolis. | White, Frank B., Excelsior. |
| Rust, Jay B., St. Paul. | Wilke, Agnese, Minneapolis. |
| Sargent, Forrest H., Red Wing, R 2. | Williams, Donald T., Minneapolis. |
| Stanley, Ward A., Minneapolis. | Williams, Ruth J., St. Louis Park, R 1. |
| Strong, Florence S., St. Paul. | Wood, Robert A., Minneapolis. |
| Taylor, Deane C., St. Paul. | Young, John Paul, St. Paul. |
| Thompson, Mark J., Winsted. | |

The School of Agriculture

"INTERMEDIATE CLASS," 8.

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|--------------------------------|----------------------------------|
| Bredvold, August J., Belview | Lewis, Pauline L., Long Lake |
| Carlton, Jay S., Owatonna | Meisch, Henry A., Minnesota City |
| Haw, John W., St. Anthony Park | Quam, Oscar A., New London |
| Heywood, Ralph M., Minneapolis | Swedberg, Jasper I., White Bear |

"A" CLASS—102.

- | | |
|---|---|
| Anderson, Agnes E., Alexandria.
Minn. | Gee, Merrill H., Minneapolis. |
| Anderson, Elmer O., Alexandria. | Gillingham, Emilie J., St. Paul. |
| Anderson, Frederic A., Minneapolis. | Hall, Fay E., Morris. |
| Austin, Florence Marlon, Winnebago. | Harrison, Earl D., Osseo, R. 1. |
| Bachelor, Herbert S., Forest Lake.
R. 26. | Hart, Iva Pearl, Farmington. |
| Baker, Matt Hartford, Wood Lake. | Hazelton, Lyman W., Cutler. |
| Beard, Lee Alexander, Kasson. | Herum, Haldor C., River Falls, Wis. |
| Berg, Alma B., Minneapolis. | Hovde, Fred T., Hanska. |
| Berry, J. Bert, St. Paul. | Howard, Burt B., Madelia. |
| Bush, Harvey M., Minneapolis. | Hunt, Florence A., St. Cloud. |
| Butterfield, Elsie Mary, Faribault. | Huseby, Bennie J., Adams. |
| Calkins, John E., Imogen, R. 1. | Jacobson, Norman G., Port Washing-
ton, Wis. |
| Cantwell, William F., White Bear. | Johnson, J. Arthur, Center City. |
| Carpenter, Fred B., Sleepy Eye, R. 5. | Jones, Clarence A., Duluth. |
| Charles, Ernest Havil, Hancock. | Jones, Myrtle M., LeSueur, R. 6. |
| Chase, Elizabeth Myrtle, Farmington. | King, Edwin H., Spring Valley, R. 4. |
| Christopherson, Edna Henrietta,
Sioux Falls, S. D. | Kottke, Edward A., Hutchinson. |
| Church, George H., St. Paul. | Lane, George E., Minnetonka, R. 2. |
| Cleland, Edgar J., Waseca. | Larson, Henrietta A., Ulen, R. 1. |
| Cole, Mary E., New York Mills. | Lathrop, Alden B., Hugo, R. 29. |
| Colombe, Robert D., Little Falls. | Lewis, Roy W., Lewisville. |
| Cooper, Percy E. R., Minneapolis. | Loegering, Aloysius J., Long Prairie. |
| Cross, Harrison J., Childs. | Lundgren, William A., Excelsior, R. 3. |
| Crysler, Flossie Winifred,
Sioux Falls, S. D. | McCurry, Myrtle V., Osakis, R. 3. |
| DeMann, Frank A., Lonsdale, R. 2. | McKinney, Jesse A., Indianapolis, Ind. |
| Denison, Ena Leona, Faribault, R. 7. | Mather, William E., Faribault. |
| Denzer, Frank John, West St. Paul. | Maylott, Eugene A., Hancock, R. 2. |
| Dorn, Ivan C., Robbinsdale. | Miller, LaVerne A., St. Paul. |
| Dow, Charles F., Worthington. | Monson, Clara I., Kenyon, R. 4. |
| Eklund, Karl O. J., Brookston. | Monson, Grace V., Elbow Lake, R. 2. |
| Engstrand, Adolph G., Dawson. | Nash, Floyd E., Robbinsdale. |
| Enright, John P., Rose Creek. | Oleson, M. Victor, Perley. |
| Erickson, Richard E., Stillwater. | Orton, Herbert, O., Elk River. |
| Flaten, Mabel R., Granite Falls. | Page, Clarence P., St. Paul. |
| Follingstad, Henry A., Zumbrota, R. 6. | Pattee, Ralph E., Minneapolis. |
| | Paulson, Emiel, Windom. |
| | Peck, Francis Winfred, St. Anthony
Park. |

Peterson, Alice B., New Ulm, R. 2.	Staples, Alice M., West Side Sta., St. Paul.
Peterson, Fred O., Olivia.	Staples, Myrtle C., West Side Sta., St. Paul.
Potter, Reuben M., Springfield	Strand, Elmor A., Ada, R. 2.
Reasoner, Margretta A., New Brighton.	Swain, Lawrence B., St. Paul.
Ricks, Nelson D., Minneapolis.	Thoe, Bertha S., Hayfield.
Riley, Ellen H., Hammond.	Tornquist, Isidro, Buenos Ayres, Argentine.
Robertson, Johan E., Appleton.	Trieloff, Harriet L., Carver.
Rollefson, Thea Serine, Clarkfield.	Trow, Clinton F., Glenville.
Sagness, Lena H., Sacred Heart, R. 2.	Underwood, William, Hutchinson.
Sargent, Ray L., Red Wing, R. 2.	Valleau, W. Dorney, St. Anthony Park.
Schmidt, William A., Osseo, R. 1.	VanDoren, Amy L., Farmington.
Selbig, Florence M., St. Paul.	Watkins, Walter O., Carlton.
Sheaff, Philip L., Stillwater.	White, Sherman L., Marshall.
Shumway, Frank E., Minneapolis.	Wolfe, Sydney J., Morristown.
Spence, Alice Vandervort, Hamilton, Ill.	
Spence, John C., Hamilton, Ill.	

"B" CLASS—185.

Aakre, Clara, Hayfield.	Crippen, Lee A., Langdon, R. 16.
Adley, C. Louls, Northome.	Croxen, John B., Monticello.
Ainsworth, Walter S., Minneapolis.	Doten, Grace E., Minneapolis.
Albee, Charles B., Caledonia.	Dubbles, Joseph, Viola.
Albers, Mary W., Northfield.	Ehlers, Frederick L., Marshall.
Allen, Percy R., Winona.	*Ekelund, Herman A., Minneapolis.
Anderson, Esther J., Minneapolis.	Ericson, Dwight S. E., Goodhue R. 6.
Anderson, George M., Minneapolis.	Ferraby, Ethel S., Minneapolis.
Anderson, Philip A. W., Forest Lake.	Fleming, Albert, St. Paul.
Anderson, Raymond E., Maple Plain.	Forbes, Charles S., West Side Sta., St. Paul.
Anderson, Sophus H., St. Anthony Park.	Francis, Merritt, Minneapolis.
Anderson, Walter R., Belgrade.	Gammon, Lee M., Excelsior, R. 3.
Ashbach, Otto B., Ada.	Giere, Constance B., Sacred Heart.
Backer, Roy F., New Ulm.	Hagen, Nellie C., Hagan.
Barsness, Alfred, Brandon.	Hall, Jennie F., Buffalo Lake.
Barsness, Thilda B., Glenwood.	Hall, Jessie M., Minneapolis.
Bartlett, Irving J., Mound.	Hallan, Henry A., Spring Grove.
Beckstrand, Andrew C., Brookfield, R. 1.	Halvorson, Mabel A., Norway Lake.
Benson, Edwin B., Jackson, R. 4.	Hamilton, Vida L., Brooklyn Center.
Berg, Edgar F., Dundas.	Hammerberg, Arvid, Shafer.
Blackburn, R. Arthur, Royal, Neb.	Hancock, Morris W., Mankato.
Blackburn, Ralph G., Royal, Neb.	Hanscome, C. Pierce, Brooklyn Center.
Bouman, Ado, Minneapolis.	Hanson, Clarence J., Hutchinson.
Bredvold, Jacob S., Belview.	Hardesty, Frank J., Minneapolis.
Brekken, Ole, Sacred Heart.	Harvey, Charles I., St. Paul.
Briggs, George M., St. Anthony Park.	Helgemoe, Julia E., Canby.
Briggs, Mary O., Houston.	Hendrickson, Wm., Northfield.
Brownell, Max C., Minneapolis.	Herum, Norman S., River Falls, Wis., R. 1.
Burfeind, Arthur H., Minneapolis.	High, Herman, New Ulm, R. 3.
Busse, Florence A., Merriam Park, R. 8.	Hinshaw, Guy M., St. Paul.
Busse, Rose O., Merriam Park, R. 8.	Hodorff, Gustave, Dixville.
Butterfield, James, Long Lake.	Hoffman, Ernest D., Marshall.
Cantine, Sarah A., Walnut Grove.	Holbrook, David W., Markesan, Wis.
Carlson, Elvera S., Minneapolis.	Holmberg, Mabel O., Minneapolis.
Carlson, Mabel H., Minneapolis.	Holmquist, Oscar W., Dawson.
Chase, Vere E., Minneapolis.	Holt, Harry G., Delhi.
Churchill, C. Parkes, Fort Dodge, Iowa.	Hordum, Florence A., Merriam Park, R. 8.
Clark, Miles D., St. Paul.	Hunt, N. K., St. Cloud.
Comnick, Bertha J., Westbrook.	Huntley, Herbert C., Hancock.
Corser, John, Minneapolis.	Jacobson, Cecile L., Madison.
Cowin, Alton B., Minneapolis.	Jacobson, Henry, Marshall.
	Jaquith, Harold H., Minnetonka, R. 1.

- Johnson, Clara V., New Richmond, Wis.
 Johnson, Ernestine M., St. Paul.
 Johnson, Henry A., Taylors Falls.
 Johnson, Myron H., Goodhue.
 Johnson, Stella A., Cannon Falls.
 Keller, John W., Dundas, R. 1.
 Kelley, Lloyd S., Markville.
 Kern, Frederick D., Minneapolis.
 Kern, Roy S., Hazel Park, St. Paul.
 Knoll, Gustave C., Minneapolis.
 Knuteson, E. George, St. Cloud.
 Krefting, Carl L., Minneapolis.
 Kuschel, Herman F., Dixville.
 Lamb, Harvey H., Mazeppa.
 Lambert, Lenora M., Withrow.
 Larson, Sallie M., North Branch.
 LaRue, Mary E., St. Paul.
 Lawrence, Frank E., Litchfield, R. 4.
 Lemke, William A., Albert Lea, R. 4.
 Lenz, Valentine L., Albert Lea.
 Lien, Harry A., Montevideo.
 Lindall, Carl O. R., Parkers Prairie.
 Lundeen, J. Edward, White Bear Lake R. 1.
 McCarty, Raymond U., Good Thunder.
 McCurry, Margaret E., Osakis, R. 3.
 McNee, William, Spring Valley.
 McNelly, Charles E., Caledonia.
 McNelly, Mary E., Caledonia.
 Mallery, Erna, Lakeville.
 Manahan, M. Dorothy, Chatfield.
 Manning, Nydia A., St. Paul.
 Mark, Levi E., Goodhue, R. 5.
 Martensen, Elvina M., Martensen, Wis.
 Mattson, Elizabeth, St. Anthony Park.
 Melwold, Dina, Fairfax, R. 1.
 Meyst, Bessie L., Minneapolis.
 Minton, Harry S., Francis, Canada.
 Moak, Inez M., St. Paul.
 Montgomery, Tracy W., Minneapolis.
 Nelson, Arthur O., Stillwater, R. 7.
 Nelson, Arthur S., Afton.
 Nelson, Ellen L., Hector.
 Nelson, Emil R., Canby, Box 113.
 Nelson, Hilma F., Litchfield.
 Nelson, Helmer, Wood Lake.
 Nelson, Ida C., Alexandria.
 Noltmiller, Warren H., St. Paul.
 Noltmiller, Roy A., St. Paul.
 Norman, Edwin C., Traverse.
 O'Bryan, Allen P., Little Falls.
 Ostendorf, Alford, Somerset, Wis., R. 2.
 Ott, John C., Albert Lea, R. 4.
 Padden, Roscoe L., Stewart.
 Palmer, Karl V., Harris.
 Patten, Norman B., Minneapolis.
 Pederson, Inga M., Irwin, Ia.
 Pedrick, William H., Minneapolis.
 Pemberton, Ada M., Eden Prairie.
 Pengilly, Alice L., Shakopee.
 Pentz, B. Elizabeth, Faribault.
 Pentz, Kenneth W., Faribault.
 Peterson, Ellen W., Lafayette.
 Peterson, Herbert C., White Bear.
 Peterson, Thorwald, Excelsior, R. 3.
 Phillips, D. Sarah, LeSueur.
 Poore, Iantha E., Bird Island.
 Rignell, Agnes D., Winthrop.
 Robertson, Charles J., Merriam Park, R. F. D.
 Sargent, Clara A., Red Wing, R. 2.
 Schrepel, Leo C., LeSueur.
 Schwab, Francesca L., Bennettville.
 Schwantes, Anna M., New Ulm.
 Smith, Ralph V., Parkers Prairie.
 Southmayd, Winthrop S., Braham.
 Squire Homer H., Hanley Falls.
 Stauffer, Clarence L., Winnebago.
 Stewart, Clarence E., Forest Lake.
 Stone, Allen W., Park Rapids.
 Sullivan, Jessie A., Minneapolis.
 Thordsen, Clara, Hanska.
 Thornton, Henry A., Appleton, R. 1.
 Torgrimson, Theofred, Hanska.
 Torne, Henry, Rich Valley.
 Tripp, Harry P., Beardsley.
 Turner, Amelia H., St. Peter.
 Turner, Evelyn M., St. Louis Park, R. 1.
 Turner Winfield H., St. Peter, R. 1.
 Upham, Thomas M., Monticello.
 Utter, Gustaf W., Ceylon.
 Victor, Emmy M., Lindstrom.
 Viets, J. Jay, Minneapolis.
 Voxland, Olaf L., Kenyon.
 Wakeman, W. Earl, Marshall.
 Warwick, James T., Goodhue, R. 5.
 Washburn, Etta R., Minneapolis.
 Watson, Irene, Merriam Park.
 Wessel, Anthony A., White Bear.
 Westmark, H. Arthur A., Minnetonka Mills, R.
 Wilcox, Richard S., White Bear Lake.
 Wilson, Walter A., Granite Falls.
 Workman, George, Villard.
 Wright, Albert D., St. Cloud.

"C" CLASS.

- Aamodt, Clara P., Cannon Falls.
 Alrich, Lawrence, Perley.
 Anderson, Arthur F., Hutchinson, R. 1.
 Anderson, Carl L., Aldrich.
 Anderson, Irene M., Aldrich.
 Arneson, Millard E., Shelly.
 Ash, Julia A., Wendell.
 Auld, Marian, Havre, Mont.
 Bahls, Benjamin J., St. Paul Park.
 Balstad, Henry O., Fosston.
 Balstad, Amanda C., Fosston.
 Barclay, Madge, Stillwater.
 Bartlett, Howard, Ellsworth.
 Bauermelster, Menjamin H., Fairfax.
 Bauermelster, Louis W., Fairfax.
 Baumann, Editha C., Springfield, Mo.
 Baumann, Edward C., Springfield, Mo.
 Bede, Russel, Pine City.
 Behnke, Gretchen, New Ulm.
 Benjamin, George W., Hutchinson.
 Bennett, William P., Austin.
 Bentdahl, John J., Hanska.

- Biscoe, Julius W., St. Paul Park.
 Bjorka, Knute, Fergus Falls, R. 7.
 Boe, George R., Lanesboro.
 Bondeson, Calextus C., Lafayette.
 Borlaug, Frederick W., Kenyon.
 Boyum, George, Rushford, R. 3.
 Brann, Alonzo, Minneapolis.
 Braxtan, Robert S., Paoli, Ind.
 Brendsel, Knut L., Humboldt, S. D.
 Brevig, Tina, Sacred Heart.
 Brink, Abel A., Askov, Denmark.
 Broberg, Leigh E., Robbinsdale.
 Brown, Jessie, Merriam Park.
 Bruce, Fred C., Ivanhoe.
 Brush, William H., Amboy.
 Budde, Theodore G., Kellogg.
 Byrne, Fred, Hart.
 Cantine, Hester E., Walnut Grove.
 Carlberg, Martha, Pennock, R. 1.
 Carlsted, Alfred, Dassel, R. 5.
 Carr, Elmer B., Excelsior, R. 3.
 Carson, James, Pipestone.
 Case, Frank T., St. Paul.
 Chase, Vera E., Farmington.
 Chase, Willis H., Farmington.
 Christensen, Frank, Porter.
 Cleator, Ralph A., Minneapolis.
 Conaughy, Laura C., Minneapolis.
 Cooper, Edgar, Adrian.
 Corbett, Alice A., Minneapolis.
 Cornwell, Earl S., Ellsworth, Wis.
 Croxen, Roy, Monticello.
 Cunningham, Leon C., Pipestone.
 Curran, Clay C., Cannon Falls.
 Dahlquist, Anna V., North Branch.
 Davidson, Louis, Emmons.
 Dempsey, Ethel, Chatfield.
 Dodds, Ralph F., Wheaton.
 Dodds, Warren, Wheaton.
 Dorn, Earl O., Brooklyn Center.
 Doten, Allan L., Osseo, R. 1.
 Dugstad, Carl, Ostrander.
 Dunning, John W., Osseo, R. 6.
 Durfey, Phineas D., Chatfield.
 Duxbury, Pierre S., St. Paul.
 Ellefsrud, Elsie, Spring Grove.
 Ellingson, Clara S., Kenyon.
 Ellsworth, Mildred, St. Paul.
 Elsberg, Ellen, Minneapolis.
 Enger, Albert L., Big Lake.
 Erickson, Elmer F., Lindstrom.
 Ericson, Elmer, Hector.
 Fellows, George C., Worthington.
 Feustel, Nettle C., Fairmont.
 Flaten, Peter M., Granite Falls.
 Forsyth, Robert J., Franklin.
 Fowler, Audrey M., Bethel.
 Frentz, Frederic H., Waseca.
 Gaynor, Fred A., Milbank, S. D.
 Gilles, Arthur P., Minneapolis.
 Gluth, Edwin A., New Ulm.
 Gordhamer, Victor, Norway Lake.
 Gray, Helen L., Sparta, Wis.
 Groger, Bruce W., St. Charles.
 Haertel, Adolph, Minneapolis.
 Haertel, Wm. J., Milwaukee, Wis.
 Halvorson, Hannah H., Hancock.
 Hansen, Martin, Eyota.
 Hanson, Elben, Stillwater.
 Hart, Charles C., Farmington.
 Hartkopf, Baldwin, Osseo.
 Hatch, Ernest G., Hewitt, R. 2.
 Hauge, Effie M., Minneapolis.
 Hector, Emery E., Worthington.
 Helgeson, Emma S., Sacred Heart.
 Hellie, Clara, Hanley Falls.
 Hellzen, Wilhem, Carkfield.
 Hendrix, Myrtle H., River Falls, Wis.
 Hennessy, Claudia S., West St. Paul.
 Herzfeld, Elsie, Lake Elmo.
 Herzfeld, Emma, Lake Elmo.
 Hewett, Clyde W., Edson.
 Hewitt, Wyman H., Nassau.
 Higgins, Eva M., Minneapolis.
 Highberg, Victor M., Gaylord.
 Hoag, Henry J., Minneapolis.
 Hoel, Frank, Minneapolis.
 Holman, Peter A., Minneapolis.
 Holte, Mary, Appleton.
 Holte, Stanley, Shelly.
 Homme, Gunder, Porter.
 Homme, Thora, Granite Falls.
 Howard, Raymond W., St. Paul Park.
 Howe, Frank E., Brooklyn Center.
 Hoyt, Corinne R., Fridley.
 Hugo, Clara, Dennison.
 Hursh, Perry C., Henning.
 Ingberg, Joseph, Hendrum.
 Jackson, Hjalmer M., Minneapolis.
 Jackson, Joel, F., Minneapolis.
 Jacobson, Alma S., Stacy.
 Jacobson, Nettie M., Port Washington, Wis.
 Joerns, Emelyn R., St. Anthony Park.
 Johanson, Algott B., Wheaton.
 Johnson, Elida S., St. Paul.
 Johnson, Ella J., Cambridge.
 Johnson, Mabel C., Milan.
 Johnson, Mabel G., Minneapolis.
 Johnson, Myrtle, E., Minneapolis.
 Jordan, Phillip S., Minneapolis.
 Jurgensen, Adella R., St. Paul.
 Kain, Raymond, Benson.
 Keefe, George P., Chatfield.
 Keenholts, Raymond J., Minneapolis.
 Kelly, Severt, Franklin.
 Kernkamp, Howard C. H., St. Paul.
 Kochler, George W., Mound.
 Kouba, James, Hutchinson.
 Krueger, Elsie S., Bellingham.
 Kueffner, Frederick, St. Paul.
 Kuehn, Gretchen, St. Paul.
 Kuehn, Karl S., St. Paul.
 Lambrecht, Carl E., St. Paul Park.
 Landey, Jens, Cohasset.
 Lang, Henry W., Appleton.
 Langness, Carl, Kenyon.
 Larson, Ella M., St. Anthony Park.
 Lathrop, Byron G., Hugo.
 Lauer, Raymond T., Richfield.
 Law, Helen A., St. Anthony Park.
 Levereos, Gertrude, St. Paul.
 Liberg, Benjamin A., Haug.
 Lindeman, Otto, North Redwood.
 Locke, Elmer B., Osseo.
 Loegering, Balbina, Long Prairie.

- Ludlow, H. Dwight, Worthington.
 Lueck, Elmer E., Spirtwood, N. Dak.
 Lunde, Anna C., Kenyon.
 Lunde, Carl, Hayward.
 Lunde, Lena, Kenyon.
 Lundgren, Herbert T., Minneapolis.
 Lynch, Robert S., St. Paul.
 McCurdy, Norma, Minneapolis.
 McDuffee, Herbert S., Minneapolis.
 McKenney, Richard E., Minneapolis.
 McMahon, Harold F., St. Paul.
 Madden, William C., Waseca, R. 6.
 Mason, Grafton Jr., St. Paul.
 Mattice, E. Burrell, Minneapolis, R. 1.
 Meck, Ethel B., St. Paul.
 Melhouse, Ingeborg M., Dennison.
 Miller, Carl A., Fawndale.
 Miller, Charles E., St. Paul.
 Moberg, Gus, St. Charles, Ill.
 Moeller, Lewis J., Kanaranzl.
 Monson, Amanda A., Minneapolis.
 Moore, Fred F., Stewart.
 Morrison, Earl B., Fergus Falls.
 Myrah, Olga G., Spring Grove.
 Neal, Winifred E., St. Paul.
 Nelson, Adolph E., Litchfield.
 Nelson, Edith R., Stillwater, R. 7.
 Nelson, Lloyd F., Goodhue.
 Nelson, Walter, St. Paul.
 Ness, Albert, Lanesboro.
 Newby, Ripley G., Plover, Wis., R. 1.
 Newgard, Clarence, Hartland.
 Newhouse, Carl O., Brandon.
 Nibbe, Harry H., Goodhue, R. 4.
 Nicholson, Marie A., Minneapolis.
 Nisius, William, New Rockford, N. D.
 Noltimier, Victor B., St. Paul Park.
 Norcross, Everett W., Minneapolis.
 Norris, Bessie M., Minneapolis.
 Nygaard, Hartvick, Hartland.
 O'Connell, John V., Goodhue, R. 5.
 Ogren, Rose J., Center City.
 Ohland, Frederick H., Gibbon.
 Oliver, Chauncey R., Granada.
 Olson, Clarence A., St. Paul.
 Olson, Frederick H., Anoka.
 Olson, Henry A., Grove City, R. 4.
 Olson, Otto, Emmons.
 Ostrem, Lewis, Lanesboro, R. 1.
 Palmer, Claude E., Minneapolis.
 Palmer, Leone, Red Wing.
 Parten, Blanda R., Minneapolis.
 Partridge, Francis E., Minneapolis.
 Paterson, Andrew, Wayzata.
 Pemberton, Ada M., Eden Prairie.
 Pemberton, Joseph D., Minneapolis.
 Peterson, Alget M., Minneapolis.
 Peterson, Axel E., Butterfield.
 Peterson, Olaf O., Hanska.
 Peterson, Mancel, Waubay, R. 3, S.
 Pfeil, Edward F., St. Charles.
 Phinney, Herbert L., Woodlake.
 Pratt, Hiram E., St. Charles, Ill.
 Precourt, Claude W., Plover, Wis., R. 1.
 Pye, Robert B., Faribault.
 Qualle, Gunder, Kenyon.
 Qualley, Martin, Hendrum.
 Randall, James H., Hinckley.
 Randolph, George H., LeSueur.
 Raymond, Ernest A., Little Falls.
 Regan, Mabel E., St. Paul.
 Rice, Maude B., Windom.
 Robb, Clarence P., Superior.
 Roble, Lueda M., Caledonia, R. 1.
 Rollefson, Hannah O., Clarkfield.
 Rosenwald, Benjamin F., Palto.
 Routhe, Oscar V., Redwood Falls, R. 4.
 Rudser, Lorenz O., Rudser, N. Dak.
 Running, Alma C., Minneapolis.
 Rustad, Elmer F., Hendrum.
 Sandager, Peter N., Tyler.
 Sanders, Amy I., Houston.
 Sandle, Hjalmar E., Rushford, R. 3.
 Sarver, Grant O., Excelsior.
 Sauer, Peter, LeSueur.
 Schmidt, Paul, Hugo, R. 1.
 Schramm, Lillian, Cottage Grove.
 Shaw, Bertha J., Minneapolis.
 Shellum, Joseph, St. James.
 Shipton, Roy L., Spring Valley.
 Smith, Esther L., New Duluth.
 Smith, George G., Chicago, Ill.
 Snow, Howard R., LeSueur.
 Sorensen, John A., Clinton.
 Spencer, Smith W., West Duluth.
 Stensrud, Hans G., Watson.
 Stephi, Otto E., LaCrosse, Wis.
 Stewart, A. Ross, St. Paul.
 Stiles, Charles H., Minneapolis.
 Strong, Hazel G., Bethel.
 Stutzman, Harry J., Newport, R. 19.
 Swenson, Albert T., Nicollet, R. 2.
 Swenson, Caroline A., Minneapolis.
 Terry, Elsie R., Lamberton.
 Theilmann, Edward, Hancock.
 Theilmann, Hattie C., Theilman.
 Theilmann, Ivy A., Excelsior.
 Thompson, Milton C., Franklin.
 Thorson, Neil, Minneapolis.
 Thulien, Axel, St. James.
 Tollefson, Cora, Madison.
 Torgerson, Clifford M., Dalton.
 Ulrich, Ellen M., Biscay.
 Upham, Charles M., Monticello.
 VanDoren, Arthur L., Farmington.
 VanTassel, Theodore, Stillwater, R. 4.
 Weium, Olaf M., Mabel.
 Wells, Mrs. Edith, Wibaux, Mont.
 Wheeler, Ralph, Minneapolis.
 White, Clifford K., Monticello, R. 2.
 White, Glenn B., Minneapolis.
 Whittet, Byron R., Redwood Falls.
 Wiberg, Phoebe, Lindstrom.
 Wickstrom, Hattie, Anoka, R. 1.
 Wolff, Norma E., St. Paul.
 Wood, Harold W., Granada.
 Woodman, Raymond H., Brooklyn Center.
 Woodward, Arthur I., Langdon.
 Young, John C., Montrose.

DAIRY SCHOOL, 93.

Bjerking, J. L., Beldenville, Wis.	Kristenson, Peder R., Fargo, N. D.
Blattner, John, St. Cloud.	Krueger, John C., Perham.
Borgert, J. B., Browsersville.	Kuennen, Ben M., St. Lucas, Ia.
Bowen, Roy, Easton.	Larson, Wm., Annandale.
Broman, Aug. L., Atwater, R. 2.	Lundberg, John, St. Paul.
Butler, Horace W., Sedan.	Magnuson, F. E., St. Croix Falls, Wis.
Carlson, P. B., Lake Benton.	Miller, Chas. W., Pine Island.
Cesak, Jos., Biscay.	Mooers, Florine J., Monticello.
Christianson, Henry, Hanska.	Mossing, Marcus N., Beldenville, Wis., R. 1.
Danielson, Ed., Maple Plain.	Moy, J. G., Fosston.
Dankmeier, Freeman W., Chili, Wis.	Mueller, Arthur, Stockton.
Degoller, H. Manley, Amery, Wis.	Newman, Otto, Villard.
Donicht, Fred, Brownton.	Olson, Clarence, Fertile.
Dotseth, Alfred, Clarkfield.	Osterberg, O. W., Carlos.
Denzel, E. A., Montrose.	Otner, Alfred, Fairfax.
Eagan, Geo. N., Iska, Ill.	Palmer, E. A., Clear Lake, Wis.
Elliott, Lloyd, Round Prairie.	Paulson, Gust A., St. James, Minn., R. 3.
Elofson, Wm. N., Thief River Falls.	Peterson, Lawrence, Atwater.
Erickson, F. E., Hutchinson.	Peterson, Theo., Maple Plain.
Engstrom, John E., Buffalo.	Pflueger, Albert, Ortonville.
Emans, Chas. L., Litchfield, R. 4.	Radke, Arthur L., Hamburg.
Fay, Clemens, M., Glencoe.	Rautenkranz, Herman, Welcome.
Feners, Jos., Holdingford.	Refling, John, Fertile.
Finstad, Alvin, New Ulm.	Reese, Thos. F., Canton.
Freeman, Herbert L., Cokato.	Rindahl, Alexander, Fertile.
Fruechte, Franklin H., Eitzen.	Roch, John J., Pierz.
Gerson, W. A., Rice Lake, Wis.	Sandergaard, Jens J., Northwood, Ia.
Greethurst, Thos. M., Lewiston.	Schilling, Jacob, Plainview.
Gustafson, S. G., Watertown.	Sell, Bruno, Brownton.
Gutzler, Jesse A., Faribault.	Sorenson, Morris, Barnum.
Hagberg, Geo. W., Cokato.	Starz, Edward, Zumbro Falls.
Hansen, Geo. Evan.	Stolpe, Walter, Howard Lake.
Hansen, Henry A., Mora.	Stamsvik, Anton, Badger.
Haslerud, Lars, Minneapolis.	Swee, Gustaf A., Wanamingo.
Hedtke, Fred W., Norwood.	Smith, Will H., Alden.
Hodorff, E. C., Royalton.	Thielke, Edward, Rockford.
Humphrey, Geo. G., Ixonia, Wis.	Thielmann, N. F., Avon.
Hovland, Gilbert A., Fertile.	Thompson, Harlow, Hutchinson.
Jacobson, O. C., Wilson, Wis.	Truleen, Harry, Vasa.
Johnson, Peter, Bird Island.	Tuttle, Alton P., Medford.
Johnson, Algot W., Clear Lake, Wis.	Wegner, Emil W., Springfield.
Johnson, Aug. C., Taylors Falls.	Werness, John, Cokato.
Johnson, Alex, Minneapolis.	Wolff, Ernest J., Bird Island.
Johnson, Gust A., Fawndale.	Winter, Loyd H., Eau Claire, Wis.
Johnson, W. C., Maynard, Ia.	Young, Conrad, Avon.
Jones, Peter, Watkins.	
Keller, Fred, Wabasso, R. 1.	
Koll, Chas. A., Eau Claire, Wis.	

SHORT COURSE, 141.

Aamodt, A. W., St. Paul.	Broecker, Emil, Otisville.
Alm, John, Page, N. Dak.	Broughton, Ray W., St Paul.
Anderson, Henry, Lake Wilson.	Bursch, O. H., Otisville.
Anderson, Joseph K., Hazel Run.	Carey, David, Minnesota Lake.
Anderson, Victor G., Litchfield.	Carlsted, Martin, Dassel.
Avery, Wilbur, Austin.	Case, Oren, Sleepy Eye.
Bahls, Geo., St. Paul Park, R. 18.	Cupp, Henry, Russell.
Bakken, O. W., Albert Lea.	Dahlgren, M. W., Minneapolis.
Berg, Oscar, Red Wing, R. 3.	Deters, W. F., Caledonia.
Bergstrom, K., New Ulm, R. 3.	Diepolder, Henry, New Ulm.
Bergum, Walter L., Kenyon.	Doughty, Richard, Milaca.
Besemer, Emil, New Ulm.	Douglas, H. B., St. Anthony Park.
Blackmer, Daniel, Albert Lea.	Drew, P. A., Plainview, R. 1.
Brakke, Lawrence, Kasson.	Efshen, Oluf, Roseau.
Brakke, Wm., Byron.	Erickson, P. W., Minneapolis.
Broberg, Carl, Dassel.	Erpestad, Joseph, Windom.

Fjestad, Theodore, Carlisle.
 Fjoslien, Ole, Elbow Lake.
 Fluggel, John, Minneiska.
 Fridman, Arthur, Bristol.
 Gabrielson, Chas., Maple Plain.
 Galles, George, Slayton.
 Garvey, Michael P., Milbank, S. Dak.
 Glaeser, Albert, Gibbon.
 Grue, John L., Willmar, R. 5.
 Haagenson, Nicolai, Fergus Falls.
 Hagen, Oscar, Montevideo, R. 5.
 Hagna, O. N., Blooming Prairie.
 Hallan, J. O., Fergus Falls.
 Halvorson, Ole O., Elbow Lake.
 Hamre, Albert, Nerstrand.
 Hare, John, Anoka, R. 2.
 Hart, Harold W., Dover.
 Harvey, D. E., Brewster.
 Heller, Max, Wood Lake.
 Helling, Sidney J., Hanska.
 Henry, John, Dover.
 Heuring, Joseph, Elk River.
 Hisdahl, Hans, Nerstrand.
 Hoberg, Andrew, Lake Benton.
 Horihan, E. L., Spring Grove, R. 6.
 Howard, Arthur B., Highwood.
 Hulbert, S. B., Richardson, Wis.
 Jardine, J. A., Sauk Center.
 Jaus, Otto, Gibson.
 Jirik, Thomas A., Webster.
 Johanning, Chas., Elk River.
 Johnson, Ambrose, Rushford.
 Johnson, Arthur W., Dassel.
 Johnson, Bennie M., Atwater.
 Johnson, David, Warren.
 Johnson, Reuben A., Hallock.
 Johnson, Walter, Lafayette.
 Knutson, Christ O., Belview.
 Koester, Henry W., Hanska.
 Lanes, Arthur, Montevideo, R. 5.
 Lapham, H. L., Caledonia, R. 1.
 Larson, Bennie, Wegdahl.
 Larson, Conrad, Sacred Heart.
 Larson, Gust. W., Sherburn.
 Larson, Winfred, Dassel.
 Lawson, Adams M., St. Paul.
 Letmolee, H. N., Sacred Heart.
 Lidberg, Rudolf, Hector.
 Lidstrom, Edward, Hastings.
 Lien, John E., Garvin.
 Lien, L. E., Renville.
 Lindgren, Swan, Kennedy.
 Lingen, Carl, Starbuck.
 Lundborg, John, St. Paul.
 Lundborg, Theodore, Belle Plaine.

Lundgren, Edward, Ortonville.
 Lundquist, Eimon, Graceville.
 Lyndgaard, Jorgen, Lake Benton.
 McCulley, Preston, Maple Plain.
 McLean, H. H., Rockford.
 Maass, W. H., Waconia.
 Mandell, Harry, Faribault.
 Nelson, Ole E., Herman.
 Niemann, Fred, Afton.
 Oberg, Ole, Hanley Falls.
 Olson, George, Lonsdale.
 Olson, Rudolph, Watson.
 Orton, Chas, Elk River.
 Peterson, Albert, Balaton.
 Peterson, C. F. Otisville.
 Peterson, Ivan E., Brewster.
 Peterson, Marie, St. Paul.
 Peterson, P. H., Delhi.
 Redland, Wm. T., Shelly.
 Rhodin, John, Cokato.
 Pietz, J. H., Waconia.
 Ritchell, Willis, St Anthony Sta., Mpls.
 Roberts, G. M., New Ulm, R. 5.
 Sawinske, August, Rochester.
 Schrantz, Arthur.
 Schroeder, Arthur, Grand Meadow.
 Sethre, Peter, Carlisle.
 Shattuck, G. W., Whalan.
 Siehl, Henry, Lake Park, R. 2.
 Simons, L. C., Red Lake Falls.
 Skabo, Halfdan, St. Paul.
 Sletvold, John, Rothsay.
 Smith, Ole, Rothsay.
 Sondergard, H. T., Litchfield.
 Speckman, August C., Sleepy Eye.
 Spjut, Eron, Herb.
 Spong, Oscar M., Marshall.
 Stocker, H. G., Dover.
 Synhorst, Wm., Woodstock.
 Synnes, Martin, Sacred Heart.
 Thompson, Andrew G., Lansing.
 Thompson, A. H., Minneapolis.
 Uptagrafft, Urias, Spirit Lake, Ia.
 VanVleet, Harry O., Minneapolis.
 Wellhausen, Ernest, Lake Park, R. 2.
 Weeks, William, Wood Lake.
 West, Lowry, Dodge Center.
 Wetter, Oscar, Princeton.
 Wickstrom, Carl, Anoka, R. 1.
 Wilson, M. G., New York Mills.
 Wonzor, Theo. A., Bemidji.
 Worden, D. A., Pipestone.
 Yapp, H. E., St Paul.
 Zuercher, Albert, Excelsior.

The College of Law

FOR THE DEGREE OF DOCTOR OF CIVIL LAW—5.

Bates, William Earl, LL.M.,	Minneapolis
Denegre, James D., LL.M.,	St. Paul
Hermann, Arthur L., LL.M.,	Minneapolis
Mercer, Hugh Victor, LL.M.,	Minneapolis
Willis, Hugh E., LL.M.,	Minneapolis

FOR THE DEGREE OF MASTER OF LAWS—9.

Bicknell, Lewis William, LL.B.,	Minneapolis
Feroe, Herman Mathew, LL.B.,	Minneapolis

Gregg, Kenneth P., LL.B.,	Minneapolis
Lien, Elias Johnson, LL.B.,	St. Paul
Mueller, Albert W., LL.B.,	New Ulm
Praxel, Anthony J., LL.B.,	Lamberton
Reiff, I. Merton, LL.B.,	Minneapolis
Schain, Josephine, LL.B.,	Minneapolis
Williams, Wadsworth A., LL.B.,	Minneapolis

FOR THE DEGREE OF BACHELOR OF LAWS.

SENIOR DAY—61.

Allison, Lawrence R.,	Minneapolis
Baker, James Bradford,	Brownton
Batzer, Reinhold Erick,	Royalton
Bott, Herman J.,	Minneapolis
Cady, Edward Philip (2 yrs. U. of M. Sc.),	Pipestone
Campbell, Roy E.,	Minneapolis
Carson, Harry Summers,	Minneapolis
Champine, Clifford C. (1 yr. U. of M. Sc.),	Fargo, N. D.
Coleman, Henry J.,	Chippewa Falls, Wis.
Colgrove, Albert Ralph (A. B., Mich.),	Minneapolis
Crawhall, Lester William,	Minneapolis
Dacey, Walter F.,	Eveleth
Davenport, Murray T. (A. B., U. of M.),	Minneapolis
Dempsey, William Henry,	Wakasha, Wis.
Donohue, William John,	Minneapolis
Doyle, David Wilfred,	Great Falls, Mont.
Dunn, Ney Marshall,	Jackson
Eenkema, Abelius,	Clara City
Evans, Eliza P.,	Minneapolis
Fawcett, Andrew,	Minneapolis
Foster, Willie Kerr,	Renville
Firestone, Milton Phillip,	St. Paul
Forbes, Mason Merrill,	Minneapolis
Fulton, David Langdon (U. of Wis.),	Minneapolis
Gage, Leroy Arthur,	Montrose, S. D.
Greene, Hammond Bey,	Sheldon, N. D.
Haas, William Hanson (A. B., St. Thomas),	St. Paul
Hamrum, Alfred Ulysses,	Franklin
Henderson, George Norman,	Red Wing
Jensen, Harry Nils,	Detroit City
Jevne, Franz,	Meridian
Johnson, Robert E.,	Marshalltown, Ia.
Joyce, Wilbur E.,	Minneapolis
Kells, Lemel L. (1 yr. U. of M. Sc.),	Spring Valley
Lockerby, Charles Emory,	Mapleton
Lohn, Lewis Kent,	Fosston
McLaughlin, Mark M.,	Mapleton
Morse, Frank Leonard,	Minneapolis
Massee, Edward K.,	St. Paul
Molyneau, Francis A.,	Winnebago City
Myron, Olin C. (A. B., U. of M.),	Vermillion, S. D.
Neal, Jared Augustus Perkins (A. B., Harvard),	Minneapolis
Nelson, Severt A.,	Humbolt, Ia.
Nicholas, Edwin Herbert (A. B., U. of M.),	Minneapolis
O'Gordon, Joseph Arthur,	Minneapolis
Oyen, Brynjolf (A. B., Augsburg),	Watson
Pattison, Edward S.,	Durand, Wis.
Roberts, Horace Wills,	Minneapolis
Rustad, Garfield H.,	Moorhead
Russell, John C.,	Fairfax
Schwartz, Louis Benjamin,	St. Paul
Searls, Spencer Judd,	St. Paul
Sigmond, Lloyd Edgar,	Zumbrota
Senn, Henry B.,	Kasson
Sigerfoos, Edward (A. B., Ohio State),	Minneapolis
Sorenson, Niles Madison,	Hayfield

Storer, George Lord,	Minneapolis
Sullivan, George Francis,	Shakopee
Swinland, Ingman,	Halsted
Washington, Derwood,	Glendive, Mont.

MIDDLE DAY—70.

Barnes, Arthur Rich (A. B., U. of M.),	Campbell
Bartlett, James,	Minneapolis
Bingham, Charles B.,	Sleepy Eye
Bremer, Paul Grover,	St. Paul
Brin, John Leonard,	Stewartville
Brown, Montreville J. (A. B., U. of M.),	Minneapolis
Cahaley, Cottrell James,	Minneapolis
Cahaley, Cottrell James,	Minneapolis
Capron, George,	Minneapolis
Christopherson, Lewis Christian,	Pewaukee, Wis.
Dickson, Marshall J.,	Fulda
Donohue, Keron Daniels,	Minneapolis
Doud, Fred L. (1 yr., Carlton),	Chatfield
Duff, Hartman Blaine,	Superior, Wis.
Duffy, Thomas E. J.,	Minneapolis
Eickhorn, Edmund,	Minneapolis
Erickson, Harold,	Hancock
Evans, Nelson James (B. A., Cornell-Ia.),	Minneapolis
Flachsenhar, Walter Roscoe,	Mankato
Fligelman, Sol,	Minneapolis
Forbes, Vernon Alex,	St. Croix Falls, Wis.
Garberg, Peder,	Mariata
Gardner, John Wm., Jr.,	Ortonville
Hanrahan, Morgan John (A. B., Creighton),	Clare, Ia.
Hanson, Thorwald (A. B., U. of M. '08),	Benson
Henderson, Fred Savage,	Northfield
Higgins, Harry Getchell,	Minneapolis
Houck, Norman Albert (1½ yrs. U. of M. Sc.),	Minneapolis
Huber, Earl Eldon,	Ellsworth, Wis.
Hudson, Irving M.,	Benson
Huntley, Earl W. (A. B., U. of M.),	Spring Valley
Kelehan, James H. L.,	Granite Falls
Kohn, Louis,	Minneapolis
LaPalme, Camille,	Minneapolis
Lampert, Jacob,	Minneapolis
Lauderdale, Henry William (2 yrs. U. of M. Sc.),	Minneapolis
Leak, John Roy,	Brainerd
Little, George Rudd (A. B., U. of M.),	Kasson
Linn, C. August,	Fergus Falls
McCanna, Simon Michael,	Minneapolis
McCoy, Charles Vaughan,	Duluth
McMillan, Malcolm Dana,	St. Paul
McNamara, Charles,	Montello, Wis.
Maloy, Charues Edward Hill,	St. Cloud
Moore, Earl M.,	Minneapolis
Muir, Robert W. (3 yrs. U. of M.),	Hunter, N. D.
Murphy, Eugene Horton,	Minneapolis
O'Brien, Clarence Burke,	Winona
O'Brien, Giles Patrick,	Brainerd
Peterson, Adolph C. (A. B., U. of M.),	Minneapolis
Prigge, Lampert F.,	Ada
Randall, Claude David (A. B., U. of M.),	St. Paul
Rasmussen, William J. (1 yr. U. of Wis.),	Phillips, Wis.
Reitz, Alfred E.,	Chaska
Schuknecht, John Robert (3 yrs. U. of M.),	Minneapolis
Senn, Fred William,	Kasson
Spicer, Fred Hopper,	Minneapolis
Spooner, Paul Lord (A. B., U. of M.),	Morris
Stern, Sam,	Fargo, N. D.
Strand, Oscar Bernard,	Zumbrota
Taylor, Wilfred Brunson,	Litchfield
Temmey, James E.,	Oneida, S. D.

Walker, Arthur J.,	Minneapolis
Walker, Charles John,	Spencer Brook
Watts, William A.,	Crookston
Webster, Clarence Bernhardt,	St. Peter
Wendtlandt, Edward W.,	Manchester, Wis.
Wheeler, George Charles,	Kekoskee, Wis.
Wilmsen, Harry Robert,	Hecla, S. D.
Wilson, Oscar Sylvanus,	Minneapolis
Wooley, Mark J.,	Howard Lake

JUNIOR DAY—142.

Adams, Innes,	Minneapolis
Allanson, Henry Gray,	Henderson
Anderson, Arthur Harragut,	Minneapolis
Atchison, William Edmond,	Minneapolis
Bailey, George,	Minneapolis
Berge, Henry S. (2 yrs. Carleton),	Minneapolis
Berry, Howard Morgan,	Mapleton
Bonifield, Ralph Ward,	Des Moines, Ia.
Bonner, John Farrington,	Winona
Borneman, Arthur DeForest,	Hallock
Brant, Charles Xien,	Renville,
Branyen, Leon Peary,	Minneapolis
Bringelson, August E.,	Dassel
Burdick, Ralph E.,	International Falls
Campbell, Hell Stillman,	Mantorville
Cannon, R. C. (A. B., U. of M. '08),	Watertown, S. D.
Canterbury, James Ralph,	Minneapolis
Chadbourn, Philip,	St. Paul
Christiansen, Clarence R.,	Northwood
Clarkson, Hugh J.,	St. Charles
Cole, Loyal, *	Minneapolis
Colgrove, Chester Walker,	Minneapolis
Conant, John,	Devil's Lake, N. D.
Crane, Ralph P.,	Austin
Cutter, Leeds Hancock,	Anoka
Comer, Cloyde E.,	Round Lake
DeLong, Frank Brooks ($\frac{1}{2}$ yr. U. of Wis.),	Elroy, Wis.
Dahl, Theodore R. (B. S., St. Olaf),	Minneapolis
Dahl, Sigvert S.,	Virginia
Davis, Homer Isaac (1 yr. U. of N. D.),	Dickinson, N. D.
Dennis, Lawrence E.,	Winslow, Ill.
Deering, Harold Cleaves (A. B., U. of M. '08),	Minneapolis
Doherty, Michael J. (3 yrs. U. of M. Sc.),	LeSueur
Evans, Albert Grant (A. B., U. of M. '08),	Duluth
Falk, Harold Newton,	Minneapolis
Finkelburg, Karl Augustus,	Winona
Fletcher, Victor W. (A. B., U. of M. '08),	Farmington
Flynn, Timothy George,	Minneapolis
Foley, Edward T.,	St. Paul
Gansle, George E.,	Minneapolis
George, James McBride,	Renville
Gibbs, Myron F.,	Tracy
Glaser, John,	Appleton, Wis.
Gould, Robert David,	St. Cloud
Granbeck, Joseph,	St. Paul
Granley, John Frank,	Minneapolis
Grant, Malcolm E.,	Faribault
Griffith, Joseph M., Jr.,	Minneapolis
Ginsberg, Abe,	Minneapolis
Haas, Charles Theodore, (A. B., St. Thomas),	St. Paul
Haller, Adolph Ignatius,	Red Wing
Halls, Carl Borre (Luther College),	Hills
Hamilton, John A. J. (2 yrs. U. of M. Sc.),	Minneapolis
Hallett, Otis Albert,	Minneapolis
Hanson, John A.,	Muskegon
Harris, George Due (1 yr. Ames),	Cedar Falls, Ia.
Hedman, Victor,	St. Paul

Held, Julius W.,	St. Louis Park
Helgersen, Lynn S.,	Plainview
Hoag, Richard Lawrence,	Minneapolis
Hoel, Ingram Harry,	Canby
Hoel, James Rudolph,	Canby
Holen, Oscar M. (1 yr. U. of M. Sc.),	Argyle
Horwitz, Henry,	St. Paul
Howes, William A.,	Tomah, Wis.
Hunter, Asa J.,	Minneapolis
Irwin, Harry A.,	Belle Plain
Jeppeson, Frederick J.,	Hopkins
Justeson, Marion B. (1 yr. U. of Wis.),	Augusta, Wis.
Kelehan, William,	Granite Falls
Kendall, John Catlin,	Minneapolis
Kenkel, John,	Minneapolis
King, William A.,	Grand Rapids
Kjomme, Hans O. (A. B., Luther College),	Decorah, Ia.
Langen, Leonard Henry,	Battle Lake
Little, Maitland F.,	Byron
Lindberg, Carl A.,	Appleton
Lindgren, Harold Clarence,	Adrian
McCallum, Raymond E.,	Langdon
McCubrey, Lewis,	Moorhead
MacDonald, Charles H.,	St. Paul
McDowall, James K.,	Seattle, Wash.
McGovern, John,	Arlington
McGrath, T. J.,	St. Paul
McGregor, Scott,	Minot, N. D.
McGuigan, Joseph,	Minneapolis
McMahon, John Francis,	Huron, S. D.
Maginnis, John,	Duluth
Martin, John F.,	Minneapolis
Mather, Verne Thomas,	Minneapolis
Mihlusen, Fred Russel,	Minneapolis
Miller, Harvey J.,	Buffalo, N. D.
Miller, Herschel Frederick,	Minneapolis
Mohl, Everett,	Adrian
Molstad, Alfred G. (1 yr. U. of M. Sc.),	Clarkfield
Morgan, Hiram,	Lake City
Mueller, Frederick C.,	St. Paul
Nelson, Clarence O.,	Granite Falls
Ness, J. A.,	Hector
Nichols, Chester,	Appleton
O'Rourke, Leo U. (B. A., St. Thomas),	Annandale
Ostensoe, Oliver Julian,	Canby
Owen, D. Cavour,	Osseo
Parker, Ralph Seth,	Bloomington
Priebe, John Gustav,	Minneapolis
Radermacher, Walter Henry,	Minneapolis
Raff, Leslie Arthur,	Crookston
Randall, Frank E. (2 yrs. Hamline),	Hamline
Ripley, W. C. (1½ yrs. Ripon),	Minneapolis
Rodsater, George I. (B. A., Luther Col.),	Manchester, Ia.
Ronning, Andrew Generious (St. Olaf),	Boyd
Rudesill, Henry Amos,	Minneapolis
Rudesill, Kora Ellis,	Minneapolis
Sallsbury, Maurice E. (A. B., U. of M. '08),	Minneapolis
Sanberg, Severt A.,	Malnes
Sanford, Leroy Woodsworth (A. B., U. of M. '08),	Minneapolis
Schlehr, Arthur F.,	Frazee
Seeger, Gustav Robert,	St. Paul
Sevaried, Ephraim (1 yr. Luther),	Kenyon
Shields, Marcellus C.,	Winona
Shipley, Albert L.,	Virginia
Sischo, Kenneth,	St. Paul
Skahen, Vance E. (2 yrs. L. Stanford),	Minneapolis
Smith, James Russell (A. B., U. of M. '08),	Minneapolis
Smith, Julian C.,	Aberdeen, S. D.
Smith, William Cornel,	Elroy, Wis.

Stewart, Earle William Russell,	Princeton, Wis.
Stockland, George Alfred,	Minneapolis
Stone, Alfred Finney (2 yrs. Carleton),	Morris
Storms, Robert,	Minneapolis
Sturley, Rodney,	St. Paul
Streissguth, Thomas,	Arlington
Tesdell, Edward S.,	Slayton, Ia.
Thoreen, Reuben	Stillwater
Torrison, Anker Osul (A. B., Luther),	Manitowoc, Wis.
Van Rhee, George Jacob (A. B., U. of M. '08),	Milaca
Warren, Earl William,	St. Paul
Weeks, Joseph G.,	Thief River
Weiland, Walter F. (1 yr. U. of M. Sc.),	Brainerd
Welte, Edward,	Lengby
Wigen, Joris,	Sargeant
Young Gerald,	Minneapolis

EVENING SCHOOL.

THIRD YEAR—21.

Brown, Marcus Edward,	St. Paul
Burk, Harvey B. (A. B., Carlton),	Leedit Falls, Ohio
Dolan, Francis Marlon (A. B., U. of M.),	St. Paul
Edquist, Reuben E.,	Minneapolis
Everhard, Frank T. (A. B., U. of M.),	Minneapolis
Gates, Cassius E. (2 yrs. U. of M. Sc.),	Alma City
Gavere, Harry,	Minneapolis
Greening, Charles William (A. B., Carlton),	Minneapolis
Groat, Benjamin Feland (A. B., U. of M.),	Minneapolis
Gurnee, William Harold,	Minneapolis
Houck, Stanley B. (2 yrs. U. of M. Sc.),	Minneapolis
Hosp, Joseph Abraham,	Hopkins
Luxton, Harry Addison,	Minneapolis
Machatanz, Karl Adolph (A. B., Ohio Wesleyan),	St. Anthony Park
Moore, Russell L.,	St. Paul
Mulally, James H. (A. B., Dartmouth),	St. Paul
Norton, Frank E. (A. B., U. of M.),	Minneapolis
Running, Clarence Herman,	Ada
Smiley, William C.,	St. Paul
Smiley, Henry Le Fevre,	Minneapolis
Stratton, Paul D. (A. B., U. of M.),	Granite Falls

SECOND YEAR—39.

Akutsu, Kenji,	Tochigi, Japan
Andersol, Albert George,	Starbuck
Baker, Clayton R. C.,	Brownton
Bowen, Oscar (B. A., Cent. U. of Ia.),	Minneapolis
Broderick, George M.,	Minneapolis
Broderick, Leo C.,	Minneapolis
Brouillard, Thomas L. (Charles City College),	Charles City, Ia.
Burroughs, Walter S.,	Winona
Campbell, P. P.,	Mayer
Carnes, Raymond John,	Renville
Case, George Leland,	St. Peter
Christiansen, Christian Theodore (B. A., U. of M. Sc.),	Minneapolis
Clutter, Guy Earl (A. B., U. of M. Sc.),	Anoka
Cowles, Ray John,	West Concord
Dart, Ray H. (A. B., U. of M. Sc.),	Litchfield
George, David Wickham (1½ yr. Mining),	Minneapolis
Hinshaw, Virgil G. (A. B., Penn.),	Minneapolis
Johnson, Chester Marius,	Austin
King, Richard,	Minneapolis
LaBelle, Dezara,	Minneapolis
Lindahl, Albert L.,	Minneapolis
McKellar, Robert Smithson,	Minneapolis
Marsh, Fayette Elaine,	Stillwater
Marwin, Paul (1 yr. U. of M. Sc.),	Minneapolis

Moe, Herman (3 yrs. Augsburg),	Minneapolis
Morse, David Lawrence (3 yrs. Cornell, Ia.),	Belmond, Ia.
Ohman, John,	Greenwood, Wis.
Persinger, Floyd T. (Ph. B., Hamline),	Minneapolis
Peterson, Albert Victor Anfield,	Minneapolis
Peterson, William Leroy,	St. Cloud
Schwestka, Claude Burr (Ph. B., Upper Iowa),	West Union, Ia.
Sinclair, John Franklin, (A. B., U. of M.),	Minneapolis
Skaug, Julius,	Minneapolis
Speeter, Harold J.,	St. Charles
Stine, Harry Irwin,	Minneapolis
Vallbrecht, Robert, (2 yrs. Col City of N. Y.),	Minneapolis
Velikanje, Emil Borguwell,	Minneapolis
Woods, George William,	St. Paul
Youngquist, Charles A.,	Minneapolis

FIRST YEAR—62.

Ackley, Edward,	Chippewa Falls, Wis.
Ashley, Lynn,	River Falls, Wis.
Aylmer, Albert R. (A. B., U. of M. '08),	Minneapolis
Baker, Harold Irwin,	Minneapolis
Bang, Svening,	Minneapolis
Behrens, Verner George,	LeRoy
Blackwell, Hiram Ross (2 yrs. U. of M. Sc.),	Minneapolis
Brady, Paul Edward,	Minneapolis
Brearley, Charles S., (3 yrs. U. of M. Sc.),	Minneapolis
Brazell, Edward Joseph,	Minneapolis
Broderick, John J. (3 yrs. U. of M. Sc.),	Minneapolis
Cheroske, Louis Sebald,	Minneapolis
Clark, Edward K.,	Minneapolis
Coakley, Raymond James,	Minneapolis
Conant, Roy B.,	Hancock, Wis.
Conant, Clarence A.,	Hancock, Wis.
Corcoran, John Bach (3 yrs. U. of Chi.),	Minneapolis
Corcoran, Frank Richard,	Minneapolis
Currier, George William, Jr.,	St. Paul
Davenport, John E. (A. B., U. of M. '08),	Fairfield
Dexter, Arthur H.,	Minneapolis
Durham, Frederick H.,	Minneapolis
Easton, Dana M. (U. of M.),	Minneapolis
Everhard, Raymond Marsh,	Minneapolis
Ferguson, E. S.,	Minneapolis
Gale, Charles H. (1 yr. U. of M. Sc.),	Minneapolis
Goodwin, Bart J.,	Minneapolis
Harter, Clarence M. (A. B., U. of M. '08),	Minneapolis
Herrick, Floyd E.,	Minneapolis
Hetzler, Henry Benedict,	Minneapolis
Kerns, Clarence,	Minneapolis
Kimball, Guy Watson (A. B., Albion),	St. Paul
Krebs, Robert D.,	Minneapolis
Lewis, Donald Cameron,	Minneapolis
Lewis, William H.,	Minneapolis
Merrill, William,	Minneapolis
Oulman, Orrin M.,	Minneapolis
Palmer, Charles Addison,	Minneapolis
Parker, Charles J.,	Minneapolis
Pearson, William Edward,	Fisher
Peterson, Albert Sanford (A. B., U. of M. '08),	Wheaton
Plankerton, Roy Earle,	Minneapolis
Pye, Hugh James (1 yr. U. of M. Sc.),	Minneapolis
Randall, R. C. (A. B., U. of M. '08),	Wheaton
Quigley, James Joseph,	Minneapolis
Quackenbush, Harry C. (A. B., U. of M.),	West Concord
Rausch, Harry,	Minneapolis
Rossmann, Claude W. (A. B., U. of M. '08),	Minneapolis
Rowberg, H. C. (A. B., U. of M. '08),	Hanley Falls
Safford, Orren E. (3 yrs. U. of M.),	Minneapolis
Seeds, Harry C. (2 yrs. Grinnell),	Manchester, Ia.

Shaw, Wilbur D. (A. B., U. of M. '08),	Minneapolis
Shave, Edgar L. (A. B., U. of M. '08),	Minneapolis
Schroeder, Florence C. (A. B., U. of M. '08),	Perham
Simer, Jerome Kenneth (A. B., U. of Ill.),	Tolono, Ill.
Smith, J. Raymond,	Minneapolis
Swan, James E. (3 yrs. U. of M.),	Minneapolis
Swanson, Victor J.,	St. Paul
Swenson, Charles A. (C. E., U. of M.),	Winthrop
Wassing, Ole M.,	Minneapolis
Young, Danxil Ruford,	St. Paul
Zoerb, Albert J. (U. of Wis. Ph. B.),	Algoma, Wis.

SPECIAL STUDENTS—91.

Abel, Ernest,	Butterfield
Beim, Nels C.,	Minneapolis
Bennett, William,	Madison
Birkeland, Berge,	Donnybrook, N. D.
Block, Arthur B.,	St. Paul
Brand, Chester,	Minneapolis
Brill, Harry Hosiah,	Minneapolis
Brown, Hosner A.,	Brownsdale
Burfening, Peter John,	Kuhn, N. D.
Brundage, Harry P.,	Minneapolis
Bryant, Glynn Arthur,	Minneapolis
Brundage, Harry P.,	Minneapolis
Bryant, Glynn Arthur,	Minneapolis
Casserly, Paul Nathaniel,	Marshall
Chalgren, Edward A.,	Sauk Rapids
Cheney, Christopher Arthur,	Minneapolis
Clark, Stella M. Dahl,	Minneapolis
Cohen, Julius,	Minneapolis
Colburn, Stanley C.,	Minneapolis
Cummings, Peter L.,	Minneapolis
Elwell, Edwin S.,	Minneapolis
Evans, William,	Minneapolis
Fay, Shiel A.,	Pipestone
Fitchette, Elwood,	Minneapolis
Foster, John Clinton,	Rosebud Ind. Ag., S. D.
Fountain, Percival T.,	Hawley
Frery, Grace B.,	Minneapolis
Full, George D.,	Pembina, N. D.
Gaus, Fred William,	Minneapolis
Graham, Raymond A.,	Rochester
Golden, Richard I.,	Minneapolis
Gran, Arthur W.,	Minneapolis
Gray, Walter Baker,	St. Paul
Gunderson, Lewis C.,	Poynette
Hall, Bruce,	Minneapolis
Hennessey, Walter H.,	Minneapolis
Hilary, Frank Charles,	Minneapolis
Hilliard, Edward Ferdinand,	Duluth
Hinch, Frederick Mortenson,	Minneapolis
Hjort, Carl Lyng,	Minneapolis
Hofman, Charles E.,	Minneapolis
Holland, Edward M.,	Minneapolis
Jelle, Gilbert,	Bricelyn
Johnson, Arthur,	St. Paul
Johnson, Charles William,	Minneapolis

McAlmon, Herbert Ross,	Madison, S. D.
McCallum, William B.,	Barry
McCarthy, J. Vernon,	Minneapolis
McDermott, Eugene Mills,	Minneapolis
McKay, Fred E.,	Minneapolis
Mackenzie, Claude H.,	Robbinsdale
Magoffin, Samuel,	St. Paul
Main, Ross C.,	Tracy
Martin, Julius Herman,	Minneapolis
Martineau, William R.,	Minneapolis
Miller, William Eugene,	St. Charles
Mitchell, John W.,	Minneapolis
Moore, Orville C.,	Minneapolis
Morrison, Neal,	Minneapolis
Nelson, Edward Bernhardt,	Minneapolis
Olson, Arthur E.,	Afton
Peterson, Adolph Martin,	Minneapolis
Posey, James,	Courtenay, N. D.
Pohlman, Ed. J. (A. B., U. of M.),	Minneapolis
Poucher, Jay Colton,	Minneapolis
Quilty, James M.,	Minneapolis
Redden, James Walter,	Minneapolis
Rose, Frank Dunham,	Minneapolis
Russell, John Francis,	Minneapolis
Reilly, Roger Eugene,	St. Paul
Saari, John,	Sparta
Sanborn, N. W. (A. B., U. of Wis.),	Ashland, Wis.
Sanford, Nelson A.,	Arnold's Park
Sahl, Gustav H. (A. B. Augsburg),	Kenyon
Scallen, Eugene A.,	Minneapolis
Shields, John A. (3 yrs. Campbell College),	Holton, Kan.
Simmons, William Reed,	Minneapolis
Swain, Hubert A.,	Minneapolis
Towers, Eugene,	Minneapolis
Wanvig, Orlando,	Minneapolis
Waters, Murray R.,	Minneapolis
Williams, Frank Joseph,	Minneapolis
Winthrop, Max S.,	Minneapolis

The College of Medicine and Surgery

FOURTH YEAR—1907-'08—35

Alexander, Ida Mary,	Carver, Minn.
A. B., University of Minnesota.	
Andrews, Roy Newberry,	Mankato, Minn.
Bloom, Charles Joseph,	Clear Lake, Wis.
A. B., '04, Carleton College.	
Bock, Rolland,	St. Paul, Minn.
Phar. C., University of Minnesota.	
Bostrom, August Edward,	Minneapolis, Minn.
B. S., '06, University of Minnesota.	
Boyd, Leon Morelle,	Alexandria, Minn.
Buckley, John,	Farmington, Minn.
Burns, Herbert Arthur,	Hutchinson, Minn.
Brown, John C.,	Minneapolis, Minn.
A. B., '99, Leland Stanford University.	
Dahleen, Henry,	Granite Falls, Minn.
Engstrom, Fred Alonzo,	Cannon Falls, Minn.
Esser, John,	Austin, Minn.
Eusterman, George Bysshe, ...	Lewiston, Minn.
Fortier, Edward L.,	Little Falls, Minn.
Freedman, Isaac Valera,	Minneapolis, Minn.
Grangaard, Henry Oswald,	Kindred, N. D.
A. B., Luther College.	
Hemingway, Ernest Eugene,	Minneapolis, Minn.
B. A., '98, Ripon, M. A., '03, University of Minnesota, Ph. D., '04, University of Minnesota.	

Hensel, Charles Norton,	St. Paul, Minn.
Hitchings, William Sidney,	Sutherland, Iowa
Johnson, Carl Martin,	Minneapolis, Minn.
B. A., Augsburg.	
Johnston, Edward James,	St. Cloud, Minn.
Lawrence, Edward John,	Marshall, Minn.
Lindberg, Arvid C.,	Harris, Minn.
Maertz, Will Francis,	New Prague, Minn.
Magnusson, Gustaf Alfred,	Harris, Minn.
A. B., University of New Mexico.	
Manley, James Rollin,	Duluth, Minn.
Nelson, Melvin Sylvanius,	Dawson, Minn.
B. S., '06, University of Minnesota.	
Roan, Carl Martin,	Minneapolis
B. A., Augsburg.	
Robertson, Archibald Wright,	Litchfield, Minn.
Ryan, Dennis Edward,	Shakopee, Minn.
A. B., St. Thomas.	
Smith, Clarke S.,	Bozeman, Mont.
Stebbins, Eugene Benson,	Barron, Wis.
Strachauer, Arthur Clarence,	Minneapolis, Minn.
Walker, John Frank,	St. Paul, Minn.
Walker, George Hamilton,	Minneapolis, Minn.
B. S., University of Nebraska.	
Watson, Tolbert,	Cashel, N. D.
B. A., Macalester.	

THIRD YEAR—52.

Anderson, Oscar H.,	Star Prairie, Wis.
Baker, Ernest L.,	Minneapolis
Barney, Leon A.,	Gettysburg, S. D.
Beede, Ethel R.,	Minneapolis
Black, William,	Minneapolis, Minn.
A. B., '03, Wabash College.	
Blakeley, Clement C.,	Neenah, Wis.
Blegen, Hallward M.,	Minneapolis, Minn.
A. B., '04, Augsburg College.	
Booren, Clifton A.,	Stillwater, Minn.
B. S., '07, University of Minnesota.	
Brimmer, Archie E.,	St. Paul, Minn.
B. S., '07, University of Minnesota.	
Brooks, Charles N.,	Minneapolis, Minn.
Caldwell, James P.,	St. Paul, Minn.
Campbell, Albert A.,	St. Paul, Minn.
Coleman, Fred,	Minneapolis, Minn.
Ph. B., Hamline University.	
Critchfield, Lyman R.,	Hunter, N. D.
B. S., '07, University of Minn.	
Delmore, John L.,	Marshfield, Wis.
B. S., '07, University of Minn.	
Doolittle, Leeroy E.,	Sioux Falls, S. D.
A. B., University of Minnesota.	
Drake, Charles R.,	Rushford, Minn.
Earl, George A.,	Minneapolis, Minn.
A. B., University of Minnesota.	
Fiksdal, Mads J.,	Webster, S. D.
Foshager, Henry T.,	Pennock, Minn.
B. S., '05, St. Olaf's College.	
Gardner, Ray,	Mantorville, Minn.
B. S., '07, University of Minnesota.	
Glyer, Richard T.,	Superior, Wis.
B. A., '07, Carroll.	
Griebenow, Frederick,	Alexandria, Minn.
A. B., '04, University of Minnesota.	
Hayes, Michael F.,	Lanesboro, Minn.
B. S., '07, University of Minn.	
Healy, Raymond T.,	Minneapolis, Minn.
Johnson, Selmer M.,	New Richland, Minn.
Kellogg, Paul M.,	Red Wing, Minn.

Kurz, John W.,	Annandale, Minn.
Larsen, Martin,	Atwater, Minn.
B. S., '07, University of Minn.	
Libby, Miss Elva E.,	Spokane, Wash.
A. B., Washington College.	
McIntyre, Phillip H.,	Litchfield, Minn.
Maxeiner, Stanley R.,	Minneapolis, Minn.
Mendelson, Oscar,	Minneapolis, Minn.
A. B., '05, University of Minnesota.	
Meyerding, Henry W.,	St. Paul, Minn.
B. S., '07, University of Minn.	
Milner, Augustus F.,	Minneapolis, Minn.
Mortensen, Nels G.,	St. Paul, Minn.
Murphy, Ignatius J.,	Lakefield, Minn.
B. S., '07, University of Minn.	
Olson, William P.,	St. Paul, Minn.
Ostergren, Edward W.,	Gladstone, Minn.
Oyen, Martin,	Watson, Minn.
Paulsen, Edward L.,	Hanska, Minn.
B. S., '07, University of Minn.	
Perry, Clarence G.,	St. Paul, Minn.
B. S., '07, University of Minn.	
Peterson, Henry F.,	Chisago City, Minn.
A. B., '02, Gustavus Adolphus College.	
Schmidt, Henry A.,	Westbrook, Minn.
Stadfield, Clayton G.,	St. Paul, Minn.
Stewart, Miss Elsie,	Minneapolis, Minn.
Sundt, Mathias,	Minneapolis, Minn.
A. B., '06, University of Minnesota.	
Sutton, Charles S.,	Prior Lake, Minn.
A. B., '06, University of Minnesota.	
Thompson, Herbert H.,	St. Paul, Minn.
B. S., '07, University of Minnesota.	
Trowbridge, E. H.,	Minneapolis, Minn.
Walker, James D.,	Moorhead, Minn.
A. B., University of North Dakota.	
Zander, Chas. H.,	Rochester, Minn.
Ph. C., '02, University of Minnesota.	

SECOND YEAR—47.

Allen, Charles C., Jr.,	Ada, Minn.
B. S., '07, Carleton College.	
Binger, Henry E.,	Tulare, S. D.
Brey, Frank,	Lafayette, Minn.
Cavanor, Frank T.,	Minneapolis, Minn.
A. B., '03, University of Illinois.	
Chernausek, Samuel,	Hutchinson, Minn.
A. B., '03, University of Minnesota.	
Christianson, Andrew	St. Paul, Minn.
Cole, Wallace,	St. Paul, Minn.
Dickson, Thomas H., Jr.,	St. Paul, Minn.
A. B., Macalester.	
*Flynn, Robert E.,	Caledonia, Minn.
Forbes, Robert S.,	Minneapolis, Minn.
Hagenback, Max. A.,	St. Paul, Minn.
*Hasty, Miss Ella M.,	Minneapolis, Minn.
Hayes, James M.,	Millville, Minn.
B. S., '04, Carleton College.	
Heidel, Cecil T.,	Sherburn, Minn.
*Hobson, Carl L.,	Hampton, Ia.
*Hoff, Alf.,	St. Paul, Minn.
*Holland, Angell S.,	Benson, Minn.
Johnson, Carl M.,	Pelican Rapids, Minn.
Julien, Albert Edward,	Braham, Minn.
A. B., '03, Hamline University.	
Kesting, Herman,	Boyd, Minn.
**Kjelland, Andrew A.,	Rushford, Minn.

*Students of combined six-year medical course, B. S., M. D.

**Students of combined seven-year medical course, B. A., M. D.

Lysne, Henry,	Northfield, Minn.
B. S., '06, St. Olaf's.	
McCarten, Robert E.,	Fargo, N. Dak.
McCarthy, Richard I.,	St. Paul, Minn.
*McEwan, Samuel W.,	Alexandria, Minn.
Moore, Chas. Ulysses,	Staples, Minn.
A. B., University of Texas.	
*Nordin, Charles G.,	St. Paul, Minn.
Ohage, Justus, Jr.,	St. Paul, Minn.
Olson, Charles A.,	St. Paul, Minn.
*Oppegard, Manford,	Madison, Minn.
Papez, James W.,	Hector, Minn.
Piper, Monte C.,	Mankato, Minn.
Preine, Irving A.,	Minneapolis, Minn.
Satersmoen, Theodore,	Lac qui Parle, Minn.
Schneider, Edwin H.,	St. Paul, Minn.
Schrader, Herman F.,	St. Paul, Minn.
A. B., '02, A. M., '03, University of Minnesota.	
Seham, Max,	Minneapolis, Minn.
*Simons, Jalmar H.,	Waseca, Minn.
*Smith, Leon G.,	Benson, Minn.
*Souba, Frederick J.,	Hopkins, Minn.
Treat, Albert M.,	Blooming Prairie, Minn.
Tyrell, Alfred A.,	Waterville, Minn.
Vigeland, Jorg G.,	Nielsville, Minn.
B. A., St. Olaf's College.	
Watson, Earl M.,	Crawfordsville, Ind.
A. B., '03, Wabash College.	
Wyman, Kate,	Northfield, Minn.
A. B., '00, Carleton College.	
*Yoerg, Otto W.,	Winthrop, Minn.
Zimmerman, James,	Vandalia, Ill.
A. B., Wabash College.	

FIRST YEAR—32.

Anderson, Francis W.,	Dickinson, N. D.
*Barnard, Elizabeth M.,	Minneapolis, Minn.
*Barron, Moses,	Minneapolis, Minn.
*Berkman, David Mayo,	Rochester, Minn.
Bill, Clayton,	Madelia, Minn.
*Craig, Russell,	Souris, N. D.
*Dedolph, Karl,	Minneapolis, Minn.
*Emert, Harry F.,	Lockport, N. Y.
*Frise, Dudley C.,	Minneapolis, Minn.
Ph. C., University of Minnesota.	
*Fulton, Philip R.,	Minneapolis, Minn.
*Geist, Geo. Arthur,	Minneapolis, Minn.
Giessler, Paul William,	Minneapolis, Minn.
*Hengstler, W. Howard,	Willmar, Minn.
Kelly, Paul Harold,	St. Paul, Minn.
Ph. C., University of Minnesota.	
**Knight, Ralph Thomas,	Minneapolis, Minn.
Kremer, Walter John,	Cold Springs, Minn.
Larkin, Chandler C.,	Minneapolis, Minn.
*Leitch, Archibald,	Minneapolis, Minn.
McLaurin, Archibald A.,	Midland, S. D.
A. B., South Dakota.	
*Madsen, Christenia A.,	Minneapolis, Minn.
Mitchell, Whiting B.,	Chehalis, Wash.
*Nicholson, Murdoch A.,	Wilcox, Ariz.
Rotnem, Thomas Peter,	Madison, Minn.
Rumreich, E. A.,	Pisek, N. D.
Ruud, Magnus,	Fosston, Minn.
B. A., North Dakota.	
Spear, Albert Edgar,	Owatonna, Minn.
Ph. B., '05, Hamline University.	
*Strobel, William G.,	Mankato, Minn.
Tallant, Webster,	Minneapolis, Minn.

Thompson, Victor C., Preston, Minn.
 *Turnacliiff, Dale D., Waseca, Minn.
 Warner, Ohmer Hubert, St. Paul, Minn.
 Ziskin, Thomas, Chisholm, Minn.

*Students of combined six-year medical course, B. S., M.D.

**Students of combined seven-year medical course, B. A., M. D.

STUDENTS IN THE COLLEGE OF PHYSICIANS AND SUR GEONS, MEDICAL DEPARTMENT, HAMLINE UNIVERSITY

ALUMNI CLASS, 1906-7

Martin Aune, Minneapolis	Byron O. Mork, Minnesota
Harry R. Baker, Minneapolis	James Murray, Rochester.
Paul E. Barringer, Minneapolis.	Frank Norman, Minnesota.
Erle B. Crosby, Minneapolis.	J. E. O'Donnell, Minneapolis.
H. C. Erickson, Wisconsin	Albert E. Phillips, Delano.
Rudolph M. Gunderson, Minnesota	Luther A. Rexford, Minneapolis.
Malvin M. Hauge, Minnesota	John O. Taft, Minneapolis.
Thorvald J. Jensen, Amboy.	M. E. Trainor, Wisconsin.
Arthur H. Jolstad, St. Paul.	Walter J. Williams, Minneapolis.
Carl H. Laws, St. Paul	

FOURTH YEAR—1907-'08

Grant Stanley Beardsley,	Edward F. Kennedy, Minneapolis.
Yucca, No. Dak.	Stanley E. Kerrick, Minneapolis.
Charles Hall Cawgill, Redwood Falls.	R. J. Kingsley, Anaconda, Mont.
Albert James Clay, Waterville.	John W. Lee, Minneapolis.
Donald Gray Colp, Robbinsdale.	Edward Masone, Minneapolis.
Earl R. Dezell, Sunset, Wash.	Troy S. Miller, Illinois.
William C. Eichler, Ada.	Virgil H. Moats, Ohio.
T. J. Froyland, Minnesota.	Walter P. Nelson, Barnesville.
W. H. G. Gibbs, Selkirk, Man., Canada.	Reinhart G. Olson, Nicollet.
Richard B. Girvin, Mankato.	Arley John Ostrander, Minneapolis.
Henry H. Hall, St. Paul.	Charles H. Patterson, Barnesville.
Roy C. Heron, St. Paul.	Theodore S. Paulson, Dalton.
Marlon M. Hursh, Henning.	Edward Schons, St. Paul.
William Howard Hollands, Canada.	George Fred Schmidt, Minneapolis.
Gaston L. Jacquot, Stillwater.	Ray Edward Smith, Minneapolis.
Einer W. Johnson, Minneapolis.	Arthur Richard Soderquist, Lafayette.
Oakford A. Kells, Minnesota	Swan G. Wright, Minneapolis.

THIRD YEAR.

Phillip J. Brady, Hastings.	Clarence Edgar Lommen, Buxton, N. D.
Richard J. Brady, Hastings.	Edison Orin McCarty, Minneapolis.
Richard R. Cranmer, Beardsley.	Daniel A. MacDonald, Wabasha.
Lewis VanDeboget, Minneapolis.	A. F. Plankers, Minneapolis
Robert Randolph Dickey, Minneapolis.	John Paul Rosenwald, Madison.
Olaf K. Eggen, Roman, No. Dak.	Francis John Schatz, Montgomery.
John James Getz, Minneapolis.	Roy Alvin Schnache, St. Paul.
Fred J. Ghostley, Minneapolis.	George Melville Sewell, Minneapolis.
Mary C. Ghostley, Minneapolis.	Frank Scofield Skemp, Minneapolis.
Seth E. Gilkey, Minneapolis	Hallward J. Thornby, Dawson.
Arthur David Haverstock, Minneapolis.	Henry Landalynn Trankle, Minneapolis.
Joel T. Holcomb, Otisville.	Alfred Lyman Vadhelm,
George F. Kaufhold, St. Paul.	Garriston, S. D.
Herbert Henry Leibold, New Ulm.	F. C. Westerman, Montgomery

SECOND YEAR

William Austin Anderson, Hopkins.	Arthur V. Garlock, Wells.
Charles Borglund, Minneapolis.	Agnes Dunnigan Gray, Minneapolis
Elmer Eugene Dady, Wabasha.	George Luther Johnson, Minnesota.
Arnt F. Floew, Minneapolis.	James Edward Johnson, St. Paul
Carl E. Foss, Park River, No. Dak.	Edward R. Kramer, Preston.

George Robert Love, Preston.
 Elizabeth Aileen Lynch, Hopkins.
 Seth Henstis Martin, Alburgh, Vt.
 Axel Sverre Nelson, Fergus Falls.
 James Robert Perkins, Minnesota.
 Leon Julien Petit, Minneapolis.
 O. I. Refsdahl, North Dakota.

Fred George Russell, Minneapolis.
 Henry Julius Shelper, Sheldon, N. D.
 Edmund C. Stucke, Minneapolis.
 Earl B. Weible, Fargo, No. Dak.
 Henry Grant Williams, Minneapolis.
 John Taylor Williams, Minneapolis.
 Joseph Nichols Woodard, Minneapolis.

FIRST YEAR.

Adams, Harold P., Minneapolis.	Lambert, Marion Jessie, Minneapolis.
Arnson, Julius Ord, Eau Claire, Wis.	Lande, Benjamin, St. Paul.
Baker, Glenn Llewellyn, Minneapolis.	Laurent, Antoine, Minneapolis.
Condit, Sannes Irving, Forest City.	McCarthy, William Reginald, Minneapolis.
Connvill, William Bernhardt, Eveleth.	McDowell, John Perry, Minneapolis.
Corry, Earl Harrison, Buxton, N. Dak.	May, Clayton Eugene, Minneapolis.
Dailey, William John, St. Paul.	Moquin, Marie Antoinette, Dartmouth.
Daskoski, John Lawrence, Minnesota City.	O'Brien, Wayne Paul, Minneapolis.
Fox, Edward Francis, St. Paul.	Raiter, Franklin Sol, Minneapolis.
Goodheart, Charles Joseph, Fargo, N. Dak.	Remington, Paul Archibald, Walnut Grove.
Hanson, Adolph Melanchthon, Red Wing.	Rutherford, Hillmar Clifford, St. Paul.
Hedenstrom, Louis Henry, St. Paul.	Schumacher, Nicholas William, Minneapolis.
Holtan, Theodore, Washburn, N. Dak.	Shalett, Benjamin Joseph, Minneapolis.
James, John Barlow, Mandan, N. Dak.	Shepherd, Foss Randall, Hamline.
Johnson, Norton Theodore, Winthrop.	Spurbeck, Roy George, Two Harbors.
Kelly, John Vincent, St. Paul.	Wilder, Curtis Warde, Minneapolis.
Kennedy, Claude Clement, Minneapolis.	Williams, Hugh Owen, Lake Crystal.
Kennedy, Roy Robert, Minneapolis.	Wilson, Clyde Earl, St. Paul.
Klint, Alfred John, Minneapolis.	Wooster, Arthur Monroe, Minneapolis.
Knaben, Tonnes O., Bowbells, N. Dak.	Ziegler, Edward Jerome, Frazee.
Lackey, Harry Munson, Minneapolis.	Hynes, Edward J., Minneapolis.

The College of Dentistry

Third Year—45.

Bandellin, William John, Arlington.	Madden, Fred M., Watertown.
Bergh, Charles John, St. Paul.	Miesen, Peter James, St. Peter.
Broderson, Clarence, Fountain City, Wis.	Mittwer, Arthur Edward, Minneapolis.
Bunce, Elmer Wayland, Minneapolis.	Moore, Thomas John, Chatfield.
Capron, Harry, Minneapolis.	Munns, Herbert Allen, Minneapolis.
Coleman, Lauren M., Ellendale, N. D.	Olson, Charles John, Hastings.
Conway, Jesse Francis, Lake City.	Radermacher, Harley Adolph, Barron, Wis.
Countryman, Ralph Williams, Minneapolis.	Rayman, Frederick Luverne, Austin.
Donald, Raymond Bristol, Minneapolis.	Remele, Herman Charles, Minneapolis.
Franta, Valentine Adolph, Montgomery.	Ringnell, Ernest Berrhart, Minneapolis.
Grafslund, Edwin, Lake Park.	Sandstrom, Carl L., Cloquet.
Hagberg, Gust Adolph, Brainerd.	Schapler, John Earl, Pipestone.
Harrison, Francis Randall, St. Cloud.	Schmitz, Leroy Christian, Jamestown, N. D.
James, Meredith Jay, Lake Crystal.	Simon, Edwin James, Faribault.
James, William Henry, Lake Crystal.	Snyder, Lynn, Lake City.
Johnson, Joseph, Edina Mills.	Spurbeck, Lee, Two Harbors.
Kaiser, Frederick John, Wells.	Tanner, William Paul, Cannon Falls.
Kjelland, Joseph Almon, Rushford.	Trench, William, Dennison.
Knoche, Karl George, St. Paul.	Van Dyke, Arthur Alexander, Alexandria.
*Kohagen, John Benjamin, Duluth.	Whitson, Abram Page, Packwauckee, Wis.
Lawton, Harry Comegys, St. Paul.	Will, Melville Bruce, Mapleton.
Leary, Daniel James, Portage, Wis.	Williams, Louis, Ashland, Wis.
Lier, Edorf Menton, Ashby.	*In attendance part of semester.

Second Year—50.

Bakke, Frederick Charles, Stephen.
 Basford, Clarence Meredith.
 Bird, Clement Keyes, West Concord.
 Cahill, John Francis, Waseca.
 Chapman, Edgar, Minneapolis.
 Chapman, LeRoy Marlon, Lanesboro.
 Coad, Cecil Walters, Minneapolis.
 Coulter, Melville Rankin, Anoka.
 Crone, William Herman, Minneapolis.
 Cryderman, William Jacob, Devils Lake, N. D.
 *Danielson, Henry, Minneapolis.
 Doris, John R., St. Paul.
 Dufner, James Jacob, St. Cloud.
 Ebersperger, Joseph F., Minneapolis.
 Ernst, Max Emil Paul, St. Paul.
 Hart, Grant Taylor, Mabel.
 Ingersoll, Howard George, Brainerd.
 Janecky, Joseph William, Hutchinson.
 Lange, Henry F., Little Falls.
 Linder, William Floyd, Minneapolis.
 Lippitt, Dunbar Francis, Duluth.
 Lund, William Theodore, Dawson.
 McFadden, Charles Atkinson, Duluth.
 McPhail, Archie, Spring Valley.
 Metcalf, George Robert, Osakis.
 Michalson, Abraham, Hudson, Wis.
 *Died Nov. 20-'07.

Mittelstaedt, Frank August, Milbank, S. D.
 Moos, William H., St. Cloud.
 Nesse, George Allen, Mabel.
 Nordin, Emil Nels, Marine Mills.
 O'Neill, James W., Lake City.
 Pagenkopf, Alford Albert, Mapleton.
 Peterson, Carl Emmanuel, Willmar.
 Phillips, Frank John, Lansing.
 Porter, Irving Lester, Willmar.
 Quast, Louis Chris, Janesville.
 Rand, Henry Dane, St. Paul.
 Rayman, Fay Washington, Austin.
 Robertson, Chester James, Casselton, N. D.
 Ruggles, Arthur Millette, Osakis.
 Salisbury, Earl, Minnewauken, N. D.
 Schwartz, Charles, Minneapolis.
 Scribner, Marguerite Sawyer, Minneapolis.
 Swanson, Arthur Emanuel, Minneapolis.
 Thullen, Carl Augustus, St. James.
 Verne, Paul Conrad, Minneapolis.
 Walker, Arthur William, Alexandria.
 Wlethoff, Charles, Minneapolis.
 Wilson, Edgar Oslander, Kasson.
 Winter, Seward Randall, Minneapolis.

First Year.—53.

Adams, Frank William, Willmar.
 Allison, James Hawxhurst, Anoka.
 Bellingham, Roscoe Charles, Bellingham.
 Braafladt, Ole Andrew, Belview.
 Brekhus, Peter John, Minneapolis.
 Campbell, William Downer, Wabasha.
 Clayton, Frederick Clayton, St. Paul.
 Dunbar, Francis Warren, Minneapolis.
 Dvorak, Joseph William, Renville.
 Francis, David Raleigh, St. Louis, Mo.
 Goldblum, Hal Sol, Minneapolis.
 Hanneman, Rudy William, Plainview.
 Hanson, William Cornelius, Sleepy Eye.
 Harris, Leslie, Park River, N. D.
 Hauck, Oscar W., Wood Lake.
 Hedman, Carl Edwin, St. Paul.
 Higgins, Robert Cloyd Dillon, Sydney, Ohio.
 Holm, Edward Olaf, Waubay, S. D.
 Hughes, Carl Leo., Hope, N. D.
 Johnson, Clement John, Winthrop.
 Jones, Howard Lysle, St. Paul.
 Jones, Frank Raymond, Minneapolis.

Krejci, Fred Otto, Hutchinson.
 La Due, Nelson Vivian, Fertile.
 Little, Arthur Paul, Appleton.
 Lyman, Harry Harlam, Caledonia.
 McBeth, Ewing Cleveland, Spokane, Wash.
 McFarlane, Arthur Reid, Minneapolis.
 McKenzie, Morell Dion, St. Paul.
 Maker, John Adolph, Lake Crystal.
 Maland, James William, Rushford.
 Markel, Bert Hill, Davis, Ill.
 Murphy, Dennis Joseph, Lakefield.
 Nelson, Harry Wilhelm, Minneapolis.
 Nelson, Roy Harrison, Hope, N. D.
 Oberg, Clarence Emanuel, Minneapolis.
 Olson, Arent, Preston.
 Otto, Frans Emil Leopold, Goteborg, Sweden.
 Pattridge, Mark Otis, Tracy.
 Petri, Carl Hjalmar, Minneapolis.
 Plass, George Arthur, Red Wing.
 *Rafferty, Thomas William, Lanesboro.
 Rauch, Benjamin, Minneapolis.
 Reynolds, George Westfall, Minneapolis.
 Rounds, William T., Sleepy Eye.

Saunders, Benjamin Harrison,
Parkers Prairie.
Smetana, Edward E., Hopkins.
Smith, Harvey Willard, Verndale.
Stangeby, Torllef Ludwig,
Minneapolis.

Thomson, Erwin Emmerson,
Minneapolis.
Washburn, Dwight Wells, Plainview.
Wells, Harry Asa, Minneapolis.
Whitney, Harry Carroll,
Wessington Springs, S. D.

*In attendance part of semester.

Specials—28.

Benjamin, Harley George,
Minneapolis.
Brady, Charles Patrick,
Red Lake Falls.
Britzus, Harry Adam, Minneapolis.
*Carpenter Dwight Jefferson,
Minneapolis.
Conway, Steven Vincent,
Minneapolis.
Davis, Oscar Detorest, Detroit.
Ertl, Rudolph William, Minneapolis.
Froelich, George Henry,
Winnebago City.
Gustafson, Richard Elmer,
Winthrop.
Haarlow, Arnold William,
Baldwin, Wis.
Harmon, Harry Weston, Faribault.
Haynes, Manley Hewitt,
Minneapolis.
Higgins, Clifford Crumbaugh,
Kirkwood, Ohio.

Hull, Isaac Stephenson, St. Paul
*Johnson, Renel Warren,
Cannon Falls.
Key, John Lewis, Huron, S. D.
Larson, Arnold John, Minneapolis.
Lawrence, Edward, Winthrop.
Lommen, John Sigurd, Caledonia.
Moorhouse, Raymond Richard,
Minneapolis.
Roth, Albert Casper, Norwood
Samuels, Harvey Charles,
Minneapolis.
Schmid, Adolph Robert, Springfield.
Scott, Louis William, Waseca.
Solberg, Chris Bernard, Montevideo.
Solem, Paul Oscar, Minneapolis.
Stockwell, John Dudley,
Hudson, Wis.
Vaughan, William Henry,
Minneapolis.

*In attendance part of semester.

The College of Pharmacy

JUNIOR PHARMACISTS

Bradley, Gaylord F., Paynesville.
Budde, Emil M., Rochester.
Bugbee, Guy C., Paynesville
—Cochrane, Edith C., St. Paul.
Colby, Hans C., Jackson.
—Constance M. Ryan, Sister.
St. Josephs Hospital, St. Paul.
Courtney, John F., Belle Plaine.
Doerr, Harry, Minneapolis.
—Elizabeth M. McGolrick, Sister.
St. Josephs Hospital, St. Paul.
Emmans, Floyd H., Minneapolis.
Erickson, William A., Cashton, Ws.
Fratzke, Theodore W., Eyota.
Glass, Philip A., River Falls, Wis.
—Gjerdingen, Nathalia L., Halstad.
Hamilton, Horace L., St. Louis Park.
Hanson, Harry, Rochester.
Hanson, William C., Sleepy Eye.
Hare, Joseph Jr., Bismarck, N. D.
Hawlish, Joseph E., Hopkins.
Hohn, Walter G., St. Paul.
James, Chas. W., Rochester.
Kellam, Ansel B., Heron Lake.
Kelly, Chas. F., Webster, S. D.
Kleihuizen, Albert E., Raymond.
—Lyman, Emily L., Ia.
Lelkvold, Albert, Waterville, Ia.
Levinson, Irving M., Seattle, Wash.

Majerus, John, Helena, Mont.
—Mathewson, Vera Mae, Minneapolis.
—Maxwell, Hazel, St. Paul.
—Meadowcroft, Grace, Ruso, N. D.
Michael, Joseph C., Jordan.
Munroe, Will R., Cummings, N. D.
Nelson, Rex G., New Richland.
Orr, Merton J., Bismarck, N. D.
Parker, Claude H., Minneapolis.
Paulson, Carl M., Minneapolis.
Peterson, Hugo O., Minneapolis.
—Peyton, Agnes, Wheaton.
—Ponthan, Marie Wilhelmina,
St. Paul.
Reierson, Carl R., Spring Grove.
Root, Nelson W., Elysian.
Samuels, Harvey C., Minneapolis.
Shima, Ryujen, Otaro, Rōkkaiaō,
Japan.
Sievert, Arthur F., New Richland.
Slawson, Frank W., Graceville.
—Snyder, Bessie E., Hector.
Speidel, Harry W., Ladysmith, Wis.
Spellman, Clyde A., Montevideo.
Spengler, Wm. M., St. Paul.
Tyrholm, Harold A., New Richland.
Wolf, George E., Olivia.
Yamagishi, Kozo, Kobe, Japan.
—Zalesky, Pauline B., St. Paul.

SENIOR PHARMACISTS

- Alcott, Dolph C., Lakefield.
 —Austin, Alberta J., Milbank, S. D.
 Becker, Frank A., Montgomery.
 Bowman, Fred M., Browns Valley.
 Buckman, Mark M., Little Falls.
 Breckenridge, John Y. Jr., Pine City.
 Carlson, Arthur E., Willmar.
 —Carlson, Helma A., Erskine.
 Casey, John A., Aitkin.
 —Caton, Mrs. Charlotte E., Minneapolis.
 Cleveland, Zina, Northfield.
 De Witz, Frank A., Rochester.
 Diessner, Chas. O., Waconia.
 Doty, Archie C., Eyota.
 Dretchko, Alvin L., Winthrop.
 Earle, Fred W., Rochester.
 Eckstein, Arthur W., New Ulm.
 Eichstadt, John, Stewartville.
 Erkenbrack, Earl S., Parkers Prairie.
 Green, Everhard, Hankinson, N. D.
 Gronvold, Bernt O., Kenyon.
 Gunderson, Alfred J., Pelican Rapids.
 —Heath, Marie J., Riga, N. D.
 Holmgren, George A., Breckenridge.
 Hooper, Archie J., Minneapolis.
 Hotvedt, Elmer L., Eau Claire, Wis.
 Jones, Edward P., Blue Earth.
 Kelly, John V., St. Paul.
 Klovstadt, Thomas, Milan.
 Kurth, Asa F., Hendricks.
 Kusterman, Frederick G., St. Cloud.
 Lafans, Alfred F., Minneapolis.
 Lambert, Ray R., Royalton.
 Lovdahl, Arthur E., Park Rapids.
 McMiller, Paul R., Carrington, N. D.
 —Nesse, Ella M., Mabel.
 Olverson, Oscar A., Clark, S. D.
 Pladson, Ingvald S., Glenwood.
 Puhl, Richard H., Menomonie, Wis.
 Schreiter, Norman C., Red Lake Falls.
 Stoppel, Ernest, Rochester.
 Van Campen, Harry, Alton.
 Weber, George C., Rochester.
 Welch, Leo S., Glencoe.
 Zender, Chas. H., Henry, S. D.

The School of Mines**SENIORS—15**

- Boyle, Patrick J., Brainerd.
 Cullyford, James A., Duluth.
 Dahl, C. F., St. Hilaire.
 Delchen, William A., St. Paul.
 Edwards, Frank R., Bowdle, S. D.
 Goodwin, W. R., Minneapolis.
 Grimes, John Alden, Minneapolis.
 Strong, John L., St. Paul.
 Kilpatrick, R. L., Minneapolis.
 Hoaas, Ole G., McIntosh.
 Kennedy, J. J., St. Paul.
 Knickerbocker, Arthur, Staples.
 Locke, Alfred, Minneapolis.
 Olmstead, John S., St. Paul.
 Peterson, Joseph S., Minneota.

JUNIORS—17

- Bischoff, Harry, St. Paul.
 Cole, Willard, Libson, N. D.
 Conkey, Charles R., Minneapolis.
 Crowley, Jay, Stillwater.
 Fletcher, Robert H., Minneapolis.
 Fritzberg, Ernest A., Biwabik.
 Gavin, Lawrence F., Staples.
 Grant, Roy C., Duluth.
 Williams, Homer A., Minneapolis.
 Halladay, F. C., Brainerd.
 Hognason, G. B., Minneota.
 Hoyt, Samuel, Minneapolis.
 Rood, Lynn, St. Paul.
 Santo, Julius H., Janesville.
 Swanson, Axel, Monticello.
 Taylor, Harold G., Minneapolis.
 Tyler, Adin P., Minneapolis.

SOPHOMORES—43

- Anderson, A. T., Lamberton.
 Barclay, Durant, Stillwater.
 Bills, E. L., Minneapolis.
 Carson, Clarke J., Glenwood.
 Chesley, J. G., Minneapolis.
 Devereux, Lawrence, Minneapolis.
 Dickinson, Roy E., Minneapolis.
 Duncan, Kenneth J., Fergus Falls.
 Elliot, Jay R., Minneapolis.
 Farnam, Henry E., Minneapolis.
 Giltinan, George M., St. Paul.
 Goodrich, Norman P., Minneapolis.
 Graves, Arthur R., Minneapolis.
 Harmon, Benjamin G., St. Paul.
 Heath, Clarence L., Janesville.
 Heidel, Charles S., Minneapolis.
 Herring, William E., Blue Earth.
 Hill, Arthur S., Minneapolis.
 Holler, Fred W., St. Paul.
 Holman, Charles F., Minneapolis.
 Hyatt, Frank L., Minneapolis.
 Jacobsen, Harry, Fergus Falls.
 Jaques, Robert A., Duluth.
 Johnson, Algot F., Cannon Falls.
 Johnson, Milford, Albert Lea.
 Jones, Ernest, Red Wing.
 Kennedy, Arthur T., Duluth.
 Kleinschmidt, Clarence, St. Paul.
 Larson, Clarence L., Waseca.
 Leonard, Forest M., Minneapolis.
 McKenzle, James R., Adrian.
 Moir, Arthur D., Minneapolis.

Moody, R. G., Minneapolis.
 Ostrand, Peter M., Atwater.
 Poppe, Walter H., Minneapolis.
 Quade, Edward H., Janesville, Minn.
 Simpson, William F., Minneapolis.
 Stewart, Gordon, Monticello.

Strane, Archie, St. Paul.
 Sundness, Odin A., Fergus Falls.
 Thomas, Clarence J., Minneapolis.
 Turner, H. Milton, Crookston.
 Wharton, N. Earl, Ashland, Wis.

FRESHMEN—73

Abbott, Le Roy, St. Peter.
 Abbott, Theodore S., St. Paul.
 Anderson, Joseph, Florence.
 Anderson, Walter C., Hopkins.
 Bailey, Paul T., Minneapolis.
 Baker, Emory P., Minneapolis.
 Beck, Chas. S., Lewiston.
 Borgeson, Anshelm C., Minneapolis.
 Burns, Donald S., South St. Paul.
 Campbell, Chas. A., Duluth.
 Claypool, J. Verner, Duluth.
 Collins, Loren F., Minneapolis.
 Cooke, Hamilton, St. Louis, Mo.
 Crouse, Stevens, Minneapolis.
 De Vey, Don W., Duluth.
 Drake, George M., Madelia.
 Ekloff, Victor E., Cokato.
 Engesser, Edward J. W., St. Peter.
 Englund, Arthur, Starbuck.
 Fixen, Victor L., Minneapolis.
 Fosness, Arthur W., Lakefield.
 Halloran, Joseph E., Langdon, N. D.
 Heaner, Henry W., Stillwater.
 Helly, Frank, Graceville.
 Hoskins, Wallis A., Hibbing.
 Hurley, John J., Pine City.
 Jahn, William F., Winona.
 Kibbe, G. E., Hampton, Iowa.
 Kingsley, Neil S., Minneapolis.
 Lange, Edward J., St. Paul.
 Lawton, J. Edward, Worthington.
 Lewis, John W., Minneapolis.
 Lindholm, Milton, Ortonville.
 McCarthy, Earl P., Minneapolis.
 McCullough, Erwin, Minneapolis.
 Martin, Dean W., Minneapolis.
 Martin, Lynn, Grand Meadow.

Maves, Theodore W., St. Peter.
 Melchior, Claude B., Hutchinson.
 Meyer, William, Minneapolis.
 Miller, Emil J., Hopkins.
 Milnor, Walter S., Minneapolis.
 Moore, Mark D., Owatonna.
 Murphy, Edward E., Winona.
 Ober, Fred L., Duluth.
 O'Brien, Charles, St. Paul.
 Olson, Alfred W., Argyle.
 Pattee, Gordon, Minneapolis.
 Perry, Joe B., Minneapolis.
 Pettigrew, Paul F., Sioux Falls, S. D.
 Rahilly, Harold, Minneapolis.
 Reusswig, Frank E., Grand Rapids.
 Robbins, Raymond S., Anoka.
 Schuster, Carl H., Rochester.
 Serum, Philip C., Jackson.
 Sherburne, Arthur, Minneapolis.
 Smith, C. C., St. Paul.
 Snyder, Leslie, Minneapolis.
 Stevens, Howard E., Stillwater.
 Swinborne, John A., Highwood.
 Tettle, John R., Canton, S. D.
 Toms, Arthur, Ely.
 Tupper, Orval W., Worthington.
 Underhill, Russell, Stillwater.
 Victor, Albin F., Lindstrom.
 Waldon, Clarence A., Minneapolis.
 Walker, E. Harold, Minneapolis.
 Walters, Chas. W., St. Paul.
 Wasson, Harold J., Minneapolis.
 Wehr, Arthur J., St. Paul.
 Whitson, Lloyd R., Fergus Falls.
 Wilkinson, Gilbert C., Minneapolis.
 Williams, James, Ely.

The School of Chemistry

SENIORS

Anderson, Edward X., Minneapolis.
 Badger, Walter L., Minneapolis.
 Cressy, Charles R., Minneapolis.
 Lowe, John M., Minneapolis.

McBride, Russell S., Minneapolis.
 Porter, A. Harold, Minneapolis.
 Whited, Oric Ogilvie, Minneapolis.

JUNIORS

Bacon, Charles B., St. Paul.
 Barnaby, William E., Minneapolis.
 Dahlberg, Henry W., Minneapolis.
 Dresser, Eva L., Minneapolis.
 Kueffner, Otto K., St. Paul.
 Mitchell, Donald F., Minneapolis.
 Morey, George W., Minneapolis.

Nye, Lillian L., Minneapolis.
 Roehrich, Victor H., St. Paul.
 Selvig, Walter A., Willmar.
 Sterling, Faith, Minneapolis.
 Walker, George Warren, Minneapolis.
 Young, Andrew, Duluth.

Larkin, Jennie V., Minneapolis.
Larsen, Kathryn Rowell, Minneapolis.
Miller, O. H., Minneapolis.
Pollock, M. Battelle, St. Paul.
Shook, Jennie L., Minneapolis.
Shook, Kate P., Minneapolis.
West, S. H., St. Paul.

The Graduate School

CANDIDATES FOR DEGREES, JUNE, 1908

FOR DOCTOR OF PHILOSOPHY—3.

- Henry Anton Erikson (B. E.E. '96), MinnesotaMinneapolis
Major, Physics; Minors, Physics, Mathematics.
Thesis: The Ionization of Gases at High Pressure.
- Frederick Casper Miller (B. A. '03, M. A. '07), MinnesotaSt. Paul
Major, Political Science; Minors, History, Geology.
Thesis: History and Organization of the Police.
- Olaf M. Norlie (B. A. '98, St. Olaf; M. A. '01, Wisconsin).....Atwater
Major, English; Minors, Education, Scandinavian.
Thesis: The Principles of Expressive Reading, A Study of the Human Voice.

FOR MASTER OF ARTS—21

- Donald C. Babcock (B. A. '07) MinnesotaGrand Forks, N. D.
Major, Sociology and Anthropology; Minors, Philosophy, Psychology.
Thesis: Origin and Development of Religious Experience.
- John M. Brendal (B. A. '06), Luther College, IowaGlenwood
Major, English; Minors, Comparative Philology, Scandinavian.
Thesis: Scandinavian Influence on English.
- Ernest J. Colberg (B. A. '06), Gustavus Adolphus CollegeSt. Peter
Major, English; Minors, Scandinavian, Latin.
Thesis: The Dramas of August Strindberg; Some Aspects of their Ideas and their Technic.
- George Rupert Eichholzer (B. A. '07), MinnesotaOwatonna
Major, Political Science; Minors, History, Economics.
Thesis: The Merit System as Applicable to the various Administrative Departments of Minnesota.
- Lucius Arnold Frye (B. A. '07), MinnesotaSt. Paul
Major, Political Science; Minors, Economics, Sociology.
Thesis: A Suggested Method of Controlling the Public Service Corporations of Minnesota.
- Grace Mitchell Groat (B. L. '99), MinnesotaMinneapolis
Major, English; Minors, French, Philology.
Thesis: The Psychology of English Rhythms.
- Howard H. Hare (B. A. '07), MinnesotaMinneapolis
Major, History; Minors, Philosophy, Greek.
Thesis: The Transition from a Provincial to a State Government in New Hampshire.
- Martin Hegland (B. A. '04), St. OlafSt. Anthony Park
Major, English Philology; Minors, Education, Philosophy.
Thesis: An Historical and Semasiological Study of some Synonyms, Nouns, Verbs and Adjectives denoting Pleasure.
- Minnie L. Hills (B. A. '07), MinnesotaSt. Paul
Major, English; Minors, Education, Sociology.
Thesis: A Comparison of Milton and Shakspeare as Thinkers and Writers.
- Albert Eddy Julien (A. B. '03), Hamline UniversityBraham
Major, Neurology; Minors, Physiology, Pathology and Bacteriology.
Thesis: The Intrinsic and Efferent Fibers of the Cerebellum.
- Homer B. Latimer (B. A. '07), MinnesotaMinneapolis
Major, Animal Biology; Minors, Animal Biology, Botany.
Thesis: The Lateral Line of Polydon Spathula.
- Edward M. Lehnerts (B. S. '02), University of PennsylvaniaMinneapolis
Major, Education; Minors, Botany, Geology.
Thesis: The Teaching of Geography.
- Migio Miyazaki (B. A. '02), Waseda University, JapanTokio
Major, Philosophy; Minors, Sociology, Education.
Thesis: Japanese Morality, a Criticism.
- Alice M. Misz (B. A. '07), MinnesotaSt. Paul
Major, Botany; Minors, Animal Biology, Geology.
Thesis: A Revision of the North American Species of Vaccinium.
- Sedona Fesenbeck Nelson (B. A. '04), University of MichiganMinneapolis
Major, English; Minors, German, Philosophy.
Thesis: Shakspeare in German Literature.
- Leonard H. Pryor (B. A. '02), MinnesotaFairmont
Major, Education; Minor, Psychology.
Thesis: A Practical Teaching of Secondary Mathematics.

- Rasmus S. Saby (B. A. '07), Minnesota Radcliffe, Ia.
Major, Political Science; Minors, Philosophy, Psychology.
Thesis: Early Railroad Legislation in Minnesota.
- Conrad G. Selvig (B. A. '07), Minnesota Rushford
Major, Education; Minors, Psychology, Sociology.
Thesis: Federal Aid to Schools.
- Emma White Shellenberger (Ph. B. '00), Univ. of Iowa ... St. Anthony Park
Major, English; Minors, German, French.
Thesis: Usage and History in English Idiom.
- Theodore T. Stenberg (B. A. '06), Minnesota Ormsby
Major, English; Minors, Philosophy, Education.
Thesis: The Function and Value of the Stage.
- Mary C. Van Wert (B. A. '05), Minnesota Minneapolis
Major, Animal Biology; Minors, Botany, Geology.
Thesis: A Contribution to the History of Entomology in the United States.

FOR MASTER OF SCIENCE—2.

- Frank Fitch Grout (B. S. '04), Minnesota Minneapolis
Major, Geology; Minors, Chemistry, Physics.
Thesis: The Granites and Associated Quartz Basalts of Stearns Co., Minn.
- John Wilson (B. S. '03), University of Wisconsin Minneapolis
Major, Sanitary Engineering; Minors, Bacteriology, Structural Engineering.
Thesis: Sewage System and Disposal Plant at the State Agricultural School and Experiment Station.

CANDIDATES ENROLLED FOR THE DEGREE OF DOCTOR OF PHILOSOPHY—8.

- Brohaugh, George O. (B. A. '89, M. A., LL. B. '93), Minnesota Red Wing
Major, Economics; Minors, Public Finance, Sociology.
Thesis: The Minnesota Pine Lands.
- Dawney, Hal (B. A. '03, M. A. '04), Minnesota Minneapolis
Major, Animal Biology; Minors, Anatomy, Neurology.
- Johnson, Mrs. Julia M. (M. A. '05), Minnesota Macalester College
Major, English; Minors, Latin, Philosophy.
- Kovarik, Alois F. (B. A. '04, M. A. '07), Minnesota Minneapolis
Major, Physics; Minors, Physics, Mechanics.
- Malmin, R. (B. A. '82, M. A.), Luther College Decorah, Ia.
Major, Hebrew; Minors, Aramaic, Jewish History.
- Melom, C. M. (B. L. '01, M. A. '02), Minnesota Minneapolis
Major, French; Minor, Spanish.
- Stevens, Homer W. (B. A. '02, B. L. '05, LL. B. '06, M. A. '07), Minnesota
Minneapolis
Major, Political Science; Minors, Economics, Law.
- Vickery, Roy Albion (B. A. '06, M. A. '07), Minnesota ... St. Anthony Park
Major, Animal Biology; Minor, Botany.

CANDIDATES ENROLLED FOR THE DEGREE OF DOCTOR OF SCIENCE—1.

- McDonald, William (B. S. '98, Ph. D. '07), Minnesota Pretoria, So. Africa
Major, Agriculture; Minors, Animal Industry, Horticulture.

CANDIDATES ENROLLED FOR THE DEGREE OF MASTER OF ARTS—36.

- Arten, O. O. (B. A. '07), St. Olaf
Major, History; Minors, Education, Scandinavian.
- Barnes, Clarence H. (B. A. '07, M. A. '07), Parker College Wells
Major, Education; Minor, Psychology.
- Brown, Harry A. (B. A. '07), Colorado Glasgow, Mont.
Major, Education; Minor, Psychology.
- Bell, Margaret G. (B. A. '05), Minnesota Minneapolis
Major, History; Minors, French, German.
- Burns, Kelvin (B. A. '03), Minnesota Minneapolis
Major, Astronomy; Minors, Mathematics, Physics.
- Carleton, E. C. (B. A. '98, M. A. '00), Augustina St. Peter
Major, Greek; Minors, English, Scandinavian.
- Chapple, B. P. (B. L. '91), Minnesota Bathgate, N. D.
Major, Education; Minor, Psychology.
- Donald, Helen D. (B. L. '06), Carleton St. Paul
Major, Sociology; Minor, History.

Dorrum, I. (B. A. '04), Luther College, Ia.	Fergus Falls
Major, Education; Minor, Psychology.	
Dungay, Niel S. (B. A. '04) Minnesota	Northfield
Major, Animal Biology; Minor, Geology.	
Groethe, Amos	Minneapolis
Major, English; Minors, Latin, Education.	
Hallstone, Augustus (B. A. '02), Luther College	Mabel
Major, History; Minors, Economics, Political Science.	
Hatch, E. S. (B. A. '03), Steilman College, Ill.	St. Louis Park
Major, Education; Minor, Psychology.	
Harris, James H.	
Major, Education; Minor, Psychology.	
Higbie, Edgar C. (B. A. Ed. '07), Minnesota	Canby
Major, Education; Minor, Agriculture.	
Holkesvik, Julian A. (B. A. '07), Luther College	Minneapolis
Major, History; Minors, Economics, Political Science.	
Hovda, Olaf (B. A. '04), Minnesota	Minneapolis
Major, Physics; Minor, Mechanics.	
Hutchinson, Drusilla C. (B. A. '01) Minnesota	Minneapolis
Major, History; Minor, English.	
Hutsinpillar, Florence W. (B. A. '04), Wellesley	Minneapolis
Major, Economics.	
Hyser, Alice Maude (B. A. '04), Minnesota	Minneapolis
Major, English; Minor, Philosophy.	
Jacobson, Martin L. (B. A. '03), Minnesota	Dawson
Major, Education; Minor, Psychology.	
Johnson, A. W. (B. A. '05), Minnesota	Minneapolis
Major, Geology; Minors, Animal Biology, Chemistry.	
Lurton, Freeman E., (B. S. '94, M. S. '97), Carleton	Fergus Falls
Major, Education; Minor, Psychology.	
Olson, C. O. Alexis (B. A. '95, B. L. '96, LL. B. '97), Minnesota ..	Minneapolis
Major, Political Science; Minors, Economics, Education.	
Palmer, Rilla W., (B. A. '07), Minnesota	St. Paul
Major, English.	
Payne, Carroll E. (Ph. B. '98), Hamline	Long Prairie
Major, Education; Minor, Psychology.	
Petterson, J. W. (B. A. '04), Luther College	St. Paul
Major, Education; Minors, English, Psychology.	
Sheldon, Eleanor (B. A. '04), Minnesota	Minneapolis
Major, English; Minors, Rhetoric, German.	
Shirer, William G. (B. A. '03), Cornell College, Ia.	Buffalo
Major, Education; Minor, Psychology.	
Thomas, William Benjamin (B. A., '03) U. of Denver, (M. A. '03) U. of Chicago	Farmington
Major, Education; Minor, Economics.	
Tressman, Conrad A. (B. A. '06), Minnesota	Minneapolis
Major, Comparative Philology; Minors, German, Education.	
True, Blanche L., (B. A. '02), Wellesley	Fargo, N. D.
Major, Comparative Philology; Minors, French, Greek.	
Trygstad, Christian (B. A. '05), St. Olaf	Rapid City, S. D.
Major, German; Minors, Latin, French.	
Van Cleve, Charles W. (B. A. '03), Ottawa Univ.	Barnesville
Major, Education; Minor, Psychology.	
Ward, Jeannette Baier (B. A. '06), Minnesota	Minneapolis
Major, English; Minor, Sociology.	
Weitzel, Grace B. (B. A. '07), Minnesota	Minneapolis
Major, Political Science; Minors, Economics, Sociology.	

CANDIDATE FOR THE DEGREE OF MASTER OF AGRICULTURE --1.

Howell, David B. (Ph. B. '06) Wisconsin	St. Anthony Park
Major, Animal Nutrition; Minor, Chemistry.	

STUDENTS TAKING GRADUATE WORK, NOT ENROLLED AS CANDIDATES FOR

DEGREES—35.

Beeler, Levi Harrison (B. A. '96), Macalester, (Ph. D. '07), Minnesota ..	Stillwater
Education, History, Economics.	

English.	
Landstrom, G. (B. A.), Gustavus Adolphus	Sandstone
German, Comparative Philology, Scandinavian.	
Levens, Lora, (Ph. B. '02), University of Chicago	Minneapolis
Education.	
Lien, Martin	St. Anthony Park
Education, Scandinavian.	
Link, George M. (B. S. '98), Wisconsin	Minneapolis
Shop work, Drawing.	
MacFarlane, Lorena (B. A. '03), Minnesota	Minneapolis
English, Sociology.	
Marlowe, Cora E. (B. A. '00), Minnesota	Minneapolis
English.	
Moll, Frank E.	Wahpeton
German, French, Comparative Philology.	
Quirk, Nellie	Minneapolis
English.	
Rapeer, Louis W. (B. S. '04), Chicago, (M.A. '07), Minnesota	Minneapolis
Education, Sociology.	
Richert, Cornelius (B. A. '00), (M. A. '01), Nebraska	St. Paul
Semitic, Sociology.	
Rockwell, Frank L.	St. Anthony Park
Forestry.	
Schisby, Marion (B. A.), Vassar	Minneapolis
English.	
Sedgwick, Emily W. (B. A.), Nebraska	Minneapolis
German.	
Shepherd, William H.	Minneapolis
Political Science.	
Stamm, Freda L. (B. A. '07), Minnesota	St. Paul
German.	
Truesdell, William H. (M. A. '06), Minnesota	Minneapolis
Chemistry.	
Williams, Charles A. (M. A.)	Minneapolis
German.	
Zoerb, A. J. (Ph. B. '06), Wisconsin	Minneapolis
Hietava	

Summary of Students

THE COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS.

	Men	Women	Total	
Senior class	67	166	233	
Junior class	73	169	242	
Sophomore class	105	215	320	
Freshman class	187	259	446	
Unclassed students	63	92	155	
	495	901	1396	1396

SIX-YEAR MEDICAL COURSE.

	Men	Women	Total	
Sophomore class	32	1	33	
Freshman class	51	4	55	
	83	5	88	88

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS.

Senior Class—

	Men	Women	Total	
Civil Engineering section	26	..	26	
Mechanical Engineering section	16	..	16	
Electrical Engineering section	28	..	28	
Municipal Engineering section	5	..	5	
Science and Technology	4	..	4	
	79	..	79	79

Junior Class—

	Men	Women	Total	
Civil Engineering section	20	..	20	
Mechanical Engineering section	22	..	22	
Electrical Engineering section	31	..	31	
Municipal Engineering section	3	..	3	
Science and Technology	2	..	2	
	78	..	78	78

Sophomore Class—

	Men	Women	Total	
Civil Engineering section	36	..	36	
Mechanical Engineering section	27	..	27	
Electrical Engineering section	48	..	48	
Municipal Engineering section	2	..	2	
Science and Technology	2	..	2	
	115	..	115	115

Freshman Class—

	Men	Women	Total	
Civil Engineering section	67	..	67	
Electrical Engineering section	30	..	30	
Electrical Engineering section	70	..	70	
Science and Technology	6	..	6	
	173	..	173	173

	Men	Women	Total	
Unclassed Students—	28	..	28	

THE DEPARTMENT OF AGRICULTURE.**The College of Agriculture—**

	Men	Women	Total	
Senior class	5	2	7	
Junior class	10	1	11	
Sophomore class	18	6	24	
Freshman class	59	15	74	
Graduate student	1	..	1	
	<hr/> 93	<hr/> 24	<hr/> 117	<hr/> 117

The School of Agriculture—

	Men	Women	Total	
Intermediate year students	7	1	8	
Class A	71	31	102	
Class B	124	61	185	
Class C	199	86	285	
Farmers' Short Course	141	..	141	
The Dairy School	93	..	93	
	<hr/> 635	<hr/> 179	<hr/> 814	<hr/> 814

THE COLLEGE OF LAW.

	Men	Women	Total	
Graduate Students for Doctor of Civil Law	5	..	5	
Graduate Students for Master of Laws	8	1	9	
Senior class	60	1	61	
Middle class	70	..	70	
Junior class	141	1	142	
Third year (night)	21	..	21	
Second year (night)	39	..	39	
First year (night)	61	1	62	
Special students	89	2	91	
	<hr/> 494	<hr/> 6	<hr/> 500	<hr/> 500

THE DEPARTMENT OF MEDICINE.**The College of Medicine and Surgery--**

	Men	Women	Total	
Senior class	34	1	35	
Junior class	49	3	52	
Sophomore class	45	2	47	
Freshman class	30	2	32	
	<hr/> 158	<hr/> 8	<hr/> 166	<hr/> 166

The College of Homeopathic Medicine and Surgery—

	Men	Women	Total	
Senior class	3	..	3	
Junior class	1	..	1	
Sophomore class	2	..	2	
Freshman class	1	..	1	
	<hr/> 7	<hr/> ..	<hr/> 7	<hr/> 7

THE COLLEGE OF DENTISTRY.

	Men	Women	Total	
Senior class	45	..	45	
Junior class	49	1	50	
Freshman class	53	..	53	
Special Students	28	..	28	
	<hr/> 175	<hr/> 1	<hr/> 176	<hr/> 176

THE COLLEGE OF PHARMACY.

	Men	Women	Total	
Senior class	40	5	45	
Junior class	42	12	54	
	<hr/> 82	<hr/> 17	<hr/> 99	<hr/> 99

THE SCHOOL OF MINES.

	Men	Women	Total	
Senior class	15	..	15	
Junior class	17	..	17	
Sophomore class	43	..	43	
Freshman class	73	..	73	
	<hr/> 148	<hr/> ..	<hr/> 148	<hr/> 148

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY.

	Men	Women	Total	
Senior class	7	..	7	
Junior class	10	3	13	
Sophomore class	18	..	18	
Freshman class	16	1	17	
Unclassed Students	10	3	13	
	<hr/> 61	<hr/> 7	<hr/> 68	<hr/> 68

THE COLLEGE OF EDUCATION.

	Men	Women	Total	
Senior class	4	7	11	
Junior class	2	4	6	
Unclassed Students	3	12	15	
	<hr/> 9	<hr/> 23	<hr/> 32	<hr/> 32

THE GRADUATE SCHOOL.

	Men	Women	Total	
Graduate Students	74	33	107	
	<hr/> 74	<hr/> 33	<hr/> 107	<hr/> 107

THE UNIVERSITY SUMMER SCHOOL.

	Men	Women	Total	
University section	109	223	332	
	<hr/> 109	<hr/> 223	<hr/> 332	<hr/> 332
				<hr/> 4523

SUMMARY OF TOTALS.

	Men	Women	Total	
The College of Science, Literature, and the Arts	495	901	1396	
Six-year Medical Course	83	5	88	
The College of Engineering and the Mechanic Arts ..	473	..	473	
The Department of Agriculture	728	203	931	
The College of Law	494	6	500	
The Department of Medicine	422	27	449	
The School of Mines	148	..	148	
The School of Analytical and Applied Chemistry	61	7	68	
The College of Education	9	23	32	
The Graduate School	74	33	107	
The Summer School, University section	109	223	332	
	<hr/> 3096	<hr/> 1427	<hr/> 4523	<hr/> 4523
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